



Forensic Services Guide

**Washington State Patrol
Forensic Laboratory Services Bureau**

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PREFACE

Technological advances constantly create a need to update evidence manuals. Examinations have either been developed or further refined since the last revision of the guide. These examinations require additional considerations for careful evidence handling and protection.

The handbook is organized to provide the following:

- A description of forensic examination services provided by the Forensic Laboratory Services Bureau and the WSP High Tech Crimes Unit. This includes services offered by each functional area work group, the types of analytical techniques used for each evidence analysis, and a list of services we cannot provide. In the case of services we cannot provide, we make every effort to help the investigator find a suitable alternative for analytical needs.
- General guidelines for the collection, preservation, and packaging of physical evidence.
- The procedure for submitting physical evidence.
- Procedures for handling various types of physical evidence.

This guide is not meant to be a comprehensive reference source for the collection and handling of physical evidence. An attempt has been made to briefly highlight the basic principles and requirements for dealing with the more common evidence types. The handbook cannot replace the caution, care, and probing reflection that are the requisites of the thorough, successful investigator. The investigator is encouraged throughout the handbook to call the crime laboratory for assistance. This is probably the best advice that we can provide: The wise investigator seeks counsel.

INTRODUCTION

FORENSIC LABORATORY SERVICES BUREAU

PO Box 42600
Olympia WA 98504
(360) 596-4120

The Forensic Laboratory Services Bureau (FLSB) of the Washington State Patrol (WSP), with bureau headquarters in Olympia, consists of three divisions: the Crime Laboratory Division, the Toxicology Laboratory Division and the Impaired Driving Section. The Crime Laboratory Division consists of laboratories in Seattle, Spokane, Tacoma, Marysville, Vancouver, Kennewick, and Olympia. All forensic toxicology services for the State of Washington are conducted at the Toxicology Laboratory located in Seattle. See the Toxicology Laboratory manual (page 110 of this manual) for guidance on collection and submission of samples for this division. The WSP High Tech Crimes Unit has its offices in Olympia. See page 107 for information regarding collection and preservation of computer evidence.

The Washington State Patrol FLSB is mandated by the Legislature to provide criminal justice agencies within the state the scientific investigative support associated with matters of a criminal nature.

This handbook offers a list of services offered in each functional area and methods of analysis typically used in these examinations. Also, the handbook describes the types of services and analyses the FLSB does not provide.

Evidence from all types of crimes is accepted from local, county, and state law enforcement agencies. Other agencies are assisted on a cooperative basis when a special need arises.

The Washington State Patrol FLSB is responsible for providing scientific support and expert testimonies relating to physical evidence from crimes by:

- Assisting at the scenes of crimes.
- Performing scientific examinations and evaluations of physical evidence in order to provide information relevant to criminal investigations.
- Participating in pretrial consultations and by providing reports, charts, graphs, and other exhibits for court purposes.
- Providing expert testimony in court trials, hearings, and depositions.
- Providing training to the criminal justice community in crime scene investigation, the role and significance of physical evidence, and the handling, collection, preservation, and packaging of physical evidence.

Section One

CRIME LABORATORY DIVISION

CRIME LABORATORIES AND SERVICES

CRIME LABORATORY DIVISION

2203 Airport Way S, Bldg. A, Suite 250
Seattle, WA 98134
Telephone: (206) 262-6002
FAX: (206) 262-6091

LABORATORIES

Seattle Crime Laboratory

2203 Airport Way S, Bldg. A, Suite 250
Seattle, WA 98134
Telephone: (206) 262-6020
FAX: (206) 262-6033

- Services: Bio/DNA analysis
Crime scene response
Explosives analysis
Fire debris analysis
Firearms/tool marks examination
Integrated Ballistics Information System (IBIS)
Forensic chemistry
Clandestine lab analysis
Seized drugs analysis, including THC Quant
Microanalysis (trace evidence)

CODIS Laboratory

2203 Airport Way S, Bldg. A, Suite 250
Seattle WA 98134
Telephone: (206) 262-6054
FAX: (206) 262-6091

- Services: Management of Statewide CODIS Database
Convicted Offender DNA Typing

Spokane Crime Laboratory

580 W 7th St
Cheney WA 99004
Telephone: (509) 625-5401
FAX: (509) 625-5440

- Services: Bio/DNA analysis
Crime scene response
Explosives analysis
Fire debris analysis
Firearms/toolmarks examination
Forensic chemistry
Seized drugs analysis, including THC Quant
Latent Prints Analysis
Microanalysis (trace evidence)
Questioned Documents

Tacoma Crime Laboratory

2502 112th St E, Room 273
Tacoma WA 98445
Telephone: (253) 538-3207
FAX: (253) 538-3275

- Services: Bio/DNA analysis
Crime scene response
Explosives analysis
Fire debris analysis
Firearms/toolmarks examination
Integrated Ballistics Information System (IBIS)
Forensic chemistry
Clandestine lab analysis
Seized drugs analysis
Microanalysis (trace evidence)

Marysville Crime Laboratory

2700 116th St NE, Suite P
Tulalip WA 98271
Telephone: (360) 654-1201
FAX: (360) 654-1213

- Services: Bio/DNA analysis
Crime scene response
Explosives analysis
Forensic chemistry
Clandestine lab analysis
Seized drugs analysis
Microanalysis (trace evidence)

Vancouver Crime Laboratory

1401 Kauffman Ave
Vancouver WA 98660
Telephone: (360) 993-3800
Fax: (360) 993-3899

- Services: Bio/DNA analysis
Crime Scene response
Fire debris analysis
Forensic chemistry
Clandestine lab analysis
Seized drugs analysis, including THC Quant

Kennewick Crime Laboratory

143302 E Law Ln
Kennewick WA 99337
Telephone: (509) 734-5820

- Services: Seized drugs analysis
Clandestine lab analysis
Forensic chemistry

Olympia Laboratory

3310 Capitol Blvd
PO Box 42608
Olympia WA 98504
Telephone: (360) 596-4525
FAX: (360) 596-4470

- Services: Crime scene response
Latent prints analysis

CRIME LAB AREAS OF RESPONSIBILITY



Service Area	Case Type	Laboratory for Submission
ALL	Toxicology cases	Toxicology Lab – Seattle
ALL	Questioned Documents	Spokane
ALL	Convicted Offender database samples	CODIS - Seattle
Clark, Cowlitz, Lewis, Pacific, Skamania Wahkiakum	Latent Prints	Olympia
	Chemistry & DNA	Vancouver
	Firearms & Microanalysis	Tacoma
Yakima	DNA	Vancouver
	Chemistry	Kennewick
	Firearms, Latent Prints & Microanalysis	Spokane
Benton, Columbia, Franklin, Klickitat, Walla Walla	Chemistry	Kennewick
	DNA, Firearms, Latent Prints & Microanalysis	Spokane
Kittitas	Latent Prints	Spokane
	Chemistry, DNA, Firearms & Microanalysis	Seattle
Grays Harbor, Mason, Thurston, Pierce	Latent Prints	Olympia
	Chemistry, DNA, Firearms & Microanalysis	Tacoma
Clallam, Island, Jefferson, San Juan, Skagit, Snohomish, Whatcom	Firearms	Seattle
	Latent Prints	Olympia
	Chemistry, DNA & Microanalysis	Marysville
Adams, Asotin, Douglas, Chelan, Ferry, Garfield, Grant, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Whitman	Chemistry, DNA, Firearms, Latent Prints & Microanalysis	Spokane
King, Kitsap	Latent Prints	Olympia
	Chemistry, DNA, Firearms & Microanalysis	Seattle

PROCEDURES FOR EVIDENCE SUBMISSION

The following procedures should be observed to properly prepare and submit physical evidence to the crime laboratory.

SHIPPING

- Most of the WSP CLD labs examine seized drugs; some types of examinations, i.e. firearms, questioned documents, latent prints are performed only at a specific laboratory. Toxicology evidence is examined at the Seattle location. Refer to the map (p. 11) to identify the appropriate laboratory. If you are unsure which lab would handle your specific evidence, check with your local crime laboratory to determine which state crime lab should receive the evidence.
- Choose a suitable shipment container so that the evidence can be securely packed and preserved during shipping. Each evidence item, if possible (see next bullet), **must** be wrapped, uniquely identified, and sealed separately to avoid contamination. Small items of evidence should be packaged in an envelope or plastic bag, no smaller than 5" x 7". Mark each evidence item with a case number and an item number. These identifiers must be on the evidence packaging or on the evidence item itself.
- If the evidence item cannot be fully packaged for submission to the laboratory (examples: a door, car hood, etc.), the area of interest must be protected and preserved when submitted to the laboratory. The submitted item still must have appropriate identifiers such as the case number and unique item number.
- Ensure the evidence packaging is sealed, clearly marked, and allows the evidence to be repackaged easily after analysis. Specific guidance for proper packaging of different types of evidence is provided in subsequent sections.
- Place the completed [Request for Laboratory Examination](#) (Form WSP-3000-210-005) in an envelope and place inside the shipping container. Do not place the RFLE form inside sealed evidence. Laboratory personnel must be able to retrieve the form without breaking any evidence seals.
- Do not staple evidence to the RFLE and do not staple multiple evidence items together.
- Send the shipping container by U.S. Postal Service or other appropriate carrier to the appropriate crime laboratory. If using the U.S. Postal Service, send by Registered or Certified Mail with a Return Receipt requested. If using another carrier, request a formal notification of delivery.
- To ship firearms and ammunition, please refer to the requirements of your carrier. Federal regulations require that firearms and ammunition be shipped in separate containers (see page 91).

NOTE: When threat-related mail is received, the first contact should be the FBI's Weapons of Mass Destruction coordinator. This individual has the responsibility for assessing the threat level and has a team of responders who can assess the nature of the threat, whether explosive, radiological or biological. The Crime Lab Division can analyze chemical and explosive materials and residues but is not equipped or trained for radiological or biological material threats.

Once the FBI has screened the evidence it may be submitted to the crime lab for chemical or explosives analysis, if appropriate, or to the Washington State Public Health Department Laboratory in Seattle for biological and radiological analysis.

The FBI Office/Seattle Weapons of Mass Destruction coordinator can be reached at (206) 622-0460.

The Washington State Public Health Laboratory can be reached at (206) 418-5450.

PERSONAL DELIVERY

- Personal delivery is the preferred method when the evidence is difficult to pack for shipping, very fragile, or if the evidence is perishable.
- Evidence concerning headlight filaments must be delivered in person to crime laboratories. See section titled "[Vehicle Lamp Evidence](#)" in the Materials Analysis section of this manual for further details on the proper packaging and handling of this type of evidence.
- Cases involving the analysis of possible unexploded explosives must be delivered in person to a laboratory that can complete these examinations. The agency will be asked to complete the CLD Explosive Safety and Evidence Checklist before submission ([Explosives Safety Checklist](#)). Note that post-blast evidence only may be shipped provided the investigator contacts the laboratory prior to shipping.
- Personal delivery allows the investigator to discuss the case and its complexities with the forensic scientist. It is advisable to telephone the crime laboratory and arrange for a meeting time with a forensic scientist when the evidence is delivered.
- Remember that sending evidence by messenger increases the length of the chain of custody. Do not send verbal instructions regarding the case with the messenger.

REQUEST FOR LABORATORY EXAMINATION (FORM 3000-210-005)

The Request for Laboratory Examination ([RFLE](#)) is the WSP form used for submitting evidence to the Crime Lab. This form must accompany all submissions of evidence to the crime laboratory. Instructions for the use of this form are printed on page 1 of the 2 page form. The form is available on the CLD website (<http://www.wsp.wa.gov/forensics/crimlabs.htm>) and should be completed electronically.

Some important points to remember when completing this form are as follows:

- Fill in all of the requested information. Incomplete forms cannot be accepted. If a suspect or victim name is unknown, indicate that in the appropriate block on the form.
- Link your current submission with any previous submission(s) from the same case. There is a convenient box near the top of the form for this purpose.
- Use the dropdown menu to list the most serious offense according to the Uniform Crime Reporting (UCR) system first. Other offenses may also be listed.
- The phone number and email address of the investigator are important. The forensic scientist(s) working on the case may need to discuss the case with the investigator.
- List the items in order of priority (most important first and the order in which the requester would like the evidence examined). Use the item numbers (or alpha-numeric name) assigned to the evidence and a very brief generic physical description to identify the item and its priority.
- In order to improve the efficiency and effectiveness of the forensic services that we provide to your agency, please contact the laboratory prior to submitting cases with 6 or more exhibits of physical evidence. A laboratory scientist will discuss with you the best evidence to submit and priority of each exhibit.

If you have any questions regarding the use of the RFLE (laboratory request) or the submission of evidence, call the crime laboratory serving your area. The addresses and phone numbers of the crime laboratories are listed in the instructions and on pages 8-10 in this manual.

Once the evidence is submitted, the scientist may contact the investigator in order to determine the best approach to the examination of the evidence. If we do not have the analytical capability/resources to complete a specific examination, we will contact the agency with that information and possible solutions. The most effective use of Crime Lab Division resources may not allow us to examine every item submitted. For example, if multiple items are submitted in a single-suspect controlled substance case, only a single item may be analyzed and the agency would not receive pre-notification beyond what is described here. If specific items require analysis or if contact is requested prior to the examination, this should be clearly noted on the RFLE submitted with the evidence. Unless explicitly stated by the agency, submission of the RFLE is acceptance of CLD authority to approve technical deviations from test methods.

Sometimes it will be necessary to shift cases and evidence to one of the other CLD labs to make better use of our available laboratory resources. Each of the laboratories has equal analytical capabilities for evidence that is transferred. This is not considered a contractor/subcontractor relationship for laboratory analysis, since the laboratories have the same capabilities.

If it is necessary for the lab division to use a non-WSP lab, either in a subcontractor relationship or because we do not offer a particular type of analysis, it is our responsibility to contact the submitting agency with this information and what may be expected from this transfer and subsequent analysis.

GENERAL GUIDELINES FOR THE COLLECTION, PRESERVATION, AND PACKAGING OF PHYSICAL EVIDENCE

The general instructions below will be helpful to the investigator. Evidence requiring special handling will be discussed in the appropriate sections of this handbook.

A few precautions are continually repeated throughout the handbook. The reason for the repetition is that these precautions are important. Failure to observe them may seriously affect the evidence examination and, potentially, the outcome of the case. Precautions regarding bloodborne pathogens are mentioned repeatedly due to the hazards that biological materials present.

Some of the guidelines may vary with your departmental policies. The guidelines here express the manner in which the crime laboratory would prefer physical evidence to be collected, preserved, packaged, and submitted.

PRECAUTIONS

Biohazard Contamination

- The handling of items contaminated with biological fluids and stains presents hazards due to the possible presence of bloodborne pathogens. Hepatitis B (HVB) and AIDS (HIV) are of particular concern to those handling liquid blood or bloodstained items. Special care must be taken when handling such materials. It is strongly advised to consult your agency "Bloodborne Pathogens Exposure Control Plan," which is required by WISHA (Washington Industrial Safety and Health Act).
- **Infectious evidence—Use universal precautions when handling biological specimens or stains** (i.e., act under the assumption that the specimen or stain contains a dangerous pathogen, particularly HIV or Hepatitis B, and proceed accordingly). Use appropriate protective equipment, such as face, eye, hand, and shoe protection. Pointed and sharp-edged objects must be handled with extreme care. Blind searches are definitely to be avoided. Searchers must not place their hands into any space that is not first visually inspected. Eyes must be protected if splashes are likely to occur.
- Eating, smoking, and the drinking of beverages at the crime scene is prohibited. Shoes should be protected from blood on the floor or grounds. The tracking of blood beyond the perimeter of the crime scene must be avoided. Careful processing of the crime scene will minimize the risk of contamination of evidence and danger to the investigator.
- Good personal hygiene must be observed. The hands should be washed thoroughly after the removal of protective gloves, even if the gloves are not cut or punctured. Used protective gear must be disposed of in a manner specified by state and federal regulations.
- Any questions should be directed to the following:
Industrial Safety and Health Division, Department of Labor and Industries, Olympia: www.lni.wa.gov.

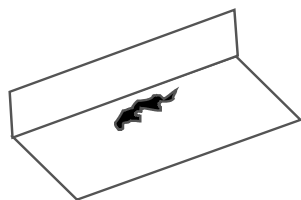
GENERAL GUIDELINES

- Meet legal requirements before entering the crime scene or collecting evidence.
 - Determine if a search warrant or court order is necessary before proceeding.

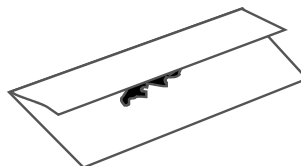
- Maintain a chain of custody. Proper documentation is necessary to prove the chain of possession from the time of collection until entered in evidence in court. It may be necessary to prove the integrity of the evidence at some later time.
- Take extra caution when collecting evidence, especially if you are the first responder to a scene. Use gloves and possibly face masks to prevent contamination of potential biological evidence. Take steps to avoid contamination of latent evidence, such as fingerprints, shoeprints, etc.
- Collect a sufficient number and amount of samples. Remember that most of the time it is difficult, if not impossible, to return to the crime scene for more samples.
 - Collect small items of evidence on clean pieces of paper and fold the paper, seal, and label (see illustrations of paper folds at the end of this section). To avoid loss, seal these smaller items into a larger container such as an envelope or plastic bag no smaller than 5" x 7".
- Labeling evidence: The following information should be noted on the container or attached tag:
 - Agency name and case number
 - Agency item number (same as listed on the RFLE)
 - Brief description of item
 - Source of item/name of subject (use actual name, not "suspect/victim")
 - Location (where found)
 - Date/time of collection
 - Name or initials of person collecting item
- Preserving evidence: The general rule is to submit the evidence in the same condition as when collected. As with nearly all rules, there are exceptions. These exceptions are noted in the discussion of each evidence type (e.g., some evidence must be dried, refrigerated, or frozen).
 - The evidence must not be allowed to spoil, deteriorate, evaporate, or in any other manner be diminished in content or evidentiary value.
 - Biological stains, leather goods, plaster casts, and vegetable matter must be thoroughly dry before submission. After drying, this type of evidence is best stored in clean paper containers. Do not use plastic containers, if possible.
- Do not contaminate the evidence: The evidence must be handled in a proper manner so that no extraneous material or substance is added.
 - Place evidence directly into a container. Avoid placing the evidence on a surface, particularly one that is soiled or that may contain material similar to that of the evidence.
 - Handle the evidence as little as possible.
 - Package items separately so that transference of possible contaminants does not occur. Care must be taken to avoid leakage and/or breakage so that liquid samples, such as blood, do not leak on other items of evidence.
 - Protect a stain with a clean piece of paper so that when clothing is folded, the stain will not be transferred to another portion of the clothing. An accidental transfer may cause the forensic scientist to misinterpret the stain pattern.

- Sealing evidence:
 - Use nonremoveable tape or evidence tape to seal evidence. Evidence packages are properly sealed if the evidence inside is protected from loss or contamination and an attempt to enter the package would be noticed. The open flaps of envelopes must be sealed with either packing or evidence tape. Scotch tape and staples do not constitute proper seals. Each seal must be initialed so that the initials touch both the tape seal and the item's packaging. **It is also a good idea to include the date across the tape seal.** Particular care must be taken when sealing containers with seized drugs.
 - Bottles and jars must be capped tightly to avoid leakage and then sealed with tape. The tape must extend across the top of the lid and down both sides of the body of the container.
 - Take all precautions to avoid the loss of evidence. Package and seal the containers to avoid leakage, tearing, or the sifting of evidence through cracks or small openings. Small packages should be over sealed into an envelope or plastic bag not smaller than 5" x 7". Consider a double package process to protect trace evidence from being lost in a larger outer container.
 - It is not always practical or necessary to seal evidence in a container in order to protect it from loss, cross contamination or deleterious change. For example, containerization and sealing are not necessary for large items such as furniture, doors and windows, and automotive components which cannot be packaged and sealed in a practical manner. In this case, the area of the item that has forensic importance should be covered so that the area is protected. The covering should be clearly marked indicating the specific area of interest.
- Control/Reference samples:
 - Control (reference/known) samples are necessary when comparisons are to be made.
 - The substrate samples to determine whether the material (substrate) on which a stain is found interferes with the stain analysis may be submitted but will only be examined if necessary.
- Shipping evidence:
 - Ship evidence by the U.S. Postal Service using either Registered or Certified Mail. Other common carriers (UPS, FEDEX, etc.) are acceptable methods of shipping. Obtain proof of delivery service when using these services.
 - Federal law requires handguns be shipped on their own. All related items, such as magazines, clips, bullets, or casings must be packaged and shipped separately. For more details, please see page 91.
 - Follow special instructions involving the shipment of biological specimens. See the Biological Section of this manual (pages 26-29) or contact your local laboratory.
 - If the evidence is very fragile (such as vehicle lamps) or in some other way difficult to ship, it should be delivered personally.

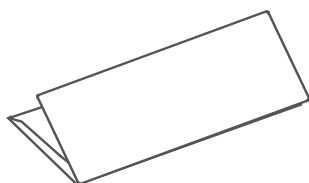
HOW TO MAKE A PAPERFOLD



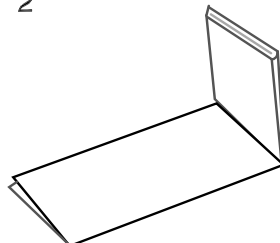
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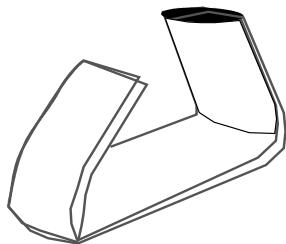
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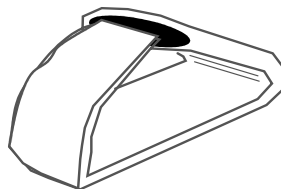
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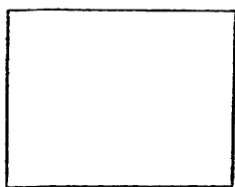
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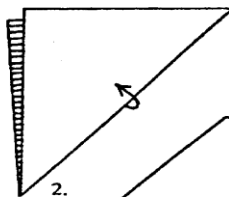
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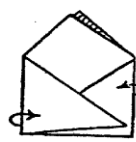
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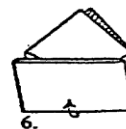
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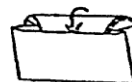
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5.



6.



7.



8.

CRIME SCENE RESPONSE TEAM

INTRODUCTION

The complexity and demands of a major crime may overwhelm the resources of a law enforcement agency. The necessity to do a thorough and complete investigation is equally incumbent upon all agencies, regardless of resources and training. The Crime Scene Response Team (CSRT) has been established to respond to calls for crime scene assistance from law enforcement agencies within the state. The CSRT consists of forensic scientists and is a free service available for response 24 hours a day.

GOALS AND OBJECTIVES

The CSRT will respond to requests by law enforcement agencies and assist the agency in a thorough assessment and examination of the physical crime scene. This will be accomplished by:

- Responding in an expeditious manner to minimize the loss of evidence.
- Assisting in the processing of the crime scene by the recognition, collection, and preservation of pertinent physical evidence.
- Recording the crime scene in an appropriate manner, including photography, sketching, diagrams, and note-taking.
- High Definition Scanning
- Providing reconstruction of events where warranted.
- Providing the requesting agency with a written report.
- Providing expert testimony as needed.

CALLOUT CRITERIA

The CSRT will respond to the following situations:

- Death investigations (except traffic fatalities)
- Sexual Assaults
- Assaults/shootings involving a law enforcement officer
- Other crimes as warranted by circumstance and resources

CALLOUT PROCEDURE

Crime Scene Response Guidelines:

The following are the guidance criteria to be considered by the CLD Crime Scene Response Coordinator in evaluating calls. These criteria are obviously not exhaustive and consideration of appropriate response will depend both on the nature of the case, the needs of the requesting agency, and the availability of scientists. Whenever appropriate, response will be scheduled for normal business hours. Examples of this would be vehicles which have been secured and impounded or are in police custody.

Before responding to any request, the requesting agency must have secured the scene and obtained a valid search warrant or otherwise legal permission to examine the scene.

Criteria to respond immediately:

- In the investigation of a homicide where the body (bodies) of the victim (suspect) is still at the scene and the agency needs any of the following: bloodstain pattern analysis, trajectory analysis, latent print evaluation and collection, scene reconstruction, and evidence recognition and collection.
- Where the suspect(s) are unidentified and remain at large, presenting a danger to the public if not identified as soon as possible.
- In the investigation of a serious crime where it is beyond the expertise of the requesting agency to best preserve and collect evidence that may deteriorate due to the weather. Examples of this would be buried or scattered body remains.
- Any investigations that involve the closure of public areas, such as an officer involved shooting on a roadway.

Criteria for Non-response:

- At a scene that has been thoroughly searched by the agency and the Crime Lab is being called to confirm that no further useful forensic evidence is present.
- At a scene where the agency has no good investigative information that the vehicle/residence/location is associated with the crime.
- At a scene where there is no compelling forensic reason to respond. An example of this is searching for hairs/fibers in a vehicle to which it was known that the victim/suspect had prior access.
- At a simple scene where verbal directions on evidence collection and preservation can be given to a Detective/Evidence Officer.

Contact Information:

The requesting law enforcement agency can request assistance from the CSRT in one of the following methods:

- Contacting the CSRT Manager at (253) 255-3064.
-
- Contacting the local area laboratory.
- Contacting the local WSP Communications Center.

The Coordinator will communicate with the requesting agency to assess the agency needs and determine the level of response.

RELATIONSHIP TO REQUESTING AGENCY

The requesting agency will retain the responsibility, authority, control, and direction of the overall investigation.

The CSRT will not transport evidence from the scene unless under special circumstances, and/or with approval from the CSRT manager or CLD Division Commander.

The requesting agency will be kept informed at all times of the status of the crime scene investigation.

The CSRT will not engage in any activity deemed unsafe, unethical, or in violation of accepted crime scene practices, WSP regulations, or Washington State laws.

Any requests for information from the news media at the scene will be referred to the requesting agency.

The CSRT will provide reports to the agency. All collected physical evidence will be maintained by the requesting agency.

CSRT responders will be available for court testimony.

BIOLOGICAL EVIDENCE

INTRODUCTION

The Washington State Patrol Biochemistry/DNA section is responsible for the forensic biochemical analyses of body fluids, stains, and cellular material (not associated with bodily fluids) and the DNA typing of biological evidence.

The majority of examinations begin with a screening procedure to identify the presence of biological material on items of evidence. When biological material has been identified from the screening process, a sample of the material can be taken for DNA analysis. Biological screening can involve a series of chemical tests to indicate the presence of a bodily fluid (Serology), or may be as simple as swabbing an item that has been reportedly touched or contacted in some way. The WSP crime lab system is capable of performing presumptive and confirmatory tests for blood and semen, and presumptive tests for urine, saliva, and feces. Limited “species of origin” testing to determine the possible nonhuman source of a biological stain can be provided for cat (felidae), dog (canidae), deer (cervidae), chicken (phasianidae), swine/pig (suidae) and cow (bovidae). Human DNA analysis (or typing) is the only type of DNA testing performed by the WSP Crime Laboratory. DNA typing is a process that involves chemically removing DNA from cells and applying molecular biology techniques to obtain a DNA profile that can be compared to other profiles. DNA profiles may be obtained from biological evidence items, or from reference/known samples collected from known individuals. DNA can be obtained from many biological sources (e.g. blood, semen, saliva, hair, organs, skin, urine, and feces). DNA typing performed on biological evidence can be used to include or exclude an individual(s) as a possible source of biological evidence and/or can be compared to the Combined DNA Index System CODIS databank.

While it has been recognized that there is a potential for DNA recovery from touch samples, where the analyst is asked to target DNA from skin cells deposited by handling an item, this kind of evidence can present challenges in trying to interpret the resulting data. Samples that are likely to have been handled by multiple sources or have been limited in handling/touch by the suspect can result in complex mixtures of DNA from multiple donors or limited information, respectively. Analysis of these samples often leads to limited (or no definitive) conclusions regarding inclusion or exclusion of a particular person of interest. As such, the WSP Crime Laboratory will normally view these handling/touch samples as ‘samples of last resort’ and they will not be analyzed if they are considered unsuitable and/or other evidence with a higher potential for developing a probative profile is available.

The conclusions drawn from DNA evidence by DNA analysts can help law enforcement investigators:

- Identify a potential perpetrator.
- Exclude individuals not involved in the crime being investigated.
- Reconstruct the events related to the crime.
- Locate the crime scene.
- Determine probability of parentage in criminal cases.
- In missing persons and unidentified remains investigations.

CASE ACCEPTANCE GUIDELINES FOR BIOLOGICAL EVIDENCE

In an effort to balance our limited resources with the needs of our customers, the increasing demand for DNA testing requires us to carefully evaluate lab requests that we receive. Despite the most current technologies to improve turnaround time for cases, our system still receives more cases each year than we are able to complete. Consequently, our DNA casework backlog continues to grow across the state.

The following case acceptance guidelines were established to improve our efficiency and promote analysis of evidence that is most likely to yield results. These guidelines will support efforts to improve customer service by reducing the backlogs and providing timely investigative information. There is great importance to and benefit from communication between customers and our DNA staff regarding case submissions.

DNA Case Acceptance Criteria:

- As discussed in the INTRODUCTION above, touch DNA samples rarely provide interpretable or CODIS-eligible profiles. Current laboratory resources cannot support the routine analysis of touch DNA samples (samples collected specifically for skin cells from handling objects). (Note that **wearer** DNA samples are generally not included in the touch category.) Examples of touch DNA samples include firearms evidence (bullets, magazines, cartridge cases, and firearms), swabs collected from firearm evidence, and samples collected from “public” surfaces (surfaces which have been in routine contact with many people). Exceptions may apply for cases involving violent crimes, if there is no other evidence, if applicable reference(s) are provided at the time of submission, and if written authorization is given to complete analysis on the submitted item(s) using the [Authorization for Consumption of DNA Evidence](#) form. Submissions of touch DNA cases should include discussions between customers and DNA staff.
- A “tiered-approach” to evidence submission will improve customer service. Customers should discuss evidence submissions with DNA staff, and first submissions will normally be limited to 5 items (not including reference samples.) These items must be listed on the required [DNA Case Supplemental Information](#) form in order of requested priority. Additional items may be submitted in a second tier through discussion with the DNA scientist or DNA supervisor.
- Property crime submissions will be limited to cases involving substantial property loss, cases that are part of a series, have a sexual component, involve crimes against government agencies, are associated with sentencing enhancements, involve thefts of large quantities of dangerous or hazardous materials, or indicate a public safety threat (the victim is home at the time of occurrence). However, we will discuss and negotiate property crime submissions in cases involving extraordinary circumstances. Property crimes should be limited to the submission of 2 items, and will require the [Authorization for Consumption of DNA Evidence](#) form and any suspect reference samples at the time of submission. Additional items may be submitted in a second tier through discussion with the DNA scientist or DNA supervisor.
- RCW 70.125.090 requires that all law enforcement agencies submit a Request for Laboratory Examination form for all sexual assault examinations kits within thirty days of receipt if consent has been given by the victim or the victim is under the age of eighteen and not emancipated. Evidence associated with active investigations may be submitted at the same time as the Request for Laboratory Examination. For nonactive investigations, a Request for Laboratory Examination (plus other supporting documentation listed below) should initially be submitted; evidence will only be accepted when requested by a DNA scientist or supervisor.

- Customers might also be asked to provide an [Authorization for Consumption of DNA Evidence](#) form if appropriate, to help expedite analysis. When possible, every effort is made to preserve at least half of the evidence; however, when dealing with limited samples, there may occur a need to consume the evidence during the course of DNA analysis. The WSP Crime Lab requires that the submitting agency (or a prosecutor) provide written authorization to consume the evidence, when needed.
- The customer should provide appropriate contact information (email, phone number). Please return our inquiry calls or emails within 21 days to avoid cancellation of the lab request and return of the evidence.

Required At the Time of Initial Submission

To improve the quality of customer service, we will request that the following items accompany initial case submissions:

- A case summary or copy of the incident report and the *Sexual Assault Kit Report* form (if applicable). The case information should contain a brief description of where (or who) evidence items came from. (Note that a forensic scientist may still need to contact you to obtain additional information about the case.)
- [DNA Case Supplemental Information](#) form (in addition to the RFLE.) Please indicate the evidence priority on this form.
- Reference samples from victim(s), suspect(s), and elimination/consensual partner(s) are required at the time of submission if possible. If you cannot provide references, please indicate the reason on the [DNA Case Supplemental Information](#) form.
- [Authorization for Consumption of DNA Evidence](#) form (this is required at the time of submission for sexual assault submissions with no charged individual and all property crime submissions.)

Note: The Firearms, Materials Analysis, Questioned Documents, and Latent Print Sections remain unaffected by this policy. For cases involving multiple examinations, this policy will only apply to evidence on which DNA analysis is requested.

TECHNOLOGY UTILIZED

DNA is chemically removed (or extracted) from biological cells. Real Time (RT) polymerase chain reaction (PCR) instruments determine how much DNA is present in the extracted sample (quantitation). Molecular biology techniques are then applied to obtain a DNA typing profile. A specific amount of DNA is then amplified using the PCR process, which targets the 20 core short tandem repeat (STR) loci recommended by the FBI and recognized by the Combined DNA Index System (CODIS), plus Amelogenin and DYS391 for sex determination and Penta D, Penta E, SE33, DYS570 and DYS576 for higher discrimination. Although it may not be possible to obtain results at all loci for every sample, the core STR loci that may be examined are: D3S1358, D1S1656, D2S441, D10S1248, D13S317, D16S539, D18S51, D2S1338, CSF1PO, TH01, vWA, D21S11, D7S820, D5S818, TPOX, D8S1179, D12S391, D19S433, D22S1045 and FGA. The amplified DNA is then run on a capillary based gel electrophoresis instrument, resulting in a DNA type for each locus. The typing results at each locus are compiled into what is referred to as a DNA typing profile.

If the amount of DNA in a sample appears insufficient to obtain a profile, the analyst has discretion to not amplify the sample. If multiple samples with similar probative value are quantitated (e.g. sexual assault evidence collection kit swabs), the analyst may choose which sample or samples (if any) to amplify based on case approach considerations, which may include discussions with the submitting agency and/or prosecutor.

Robotic liquid handling systems are used by the laboratory and may be employed during certain steps of the DNA typing process.

Y-STR

Y-STR analysis is similar to the standard DNA service offered, but focuses exclusively on male DNA.

Benefits and Applications:

- Samples where large quantities of female DNA may be obscuring the smaller male DNA component. Examples of appropriate cases and samples include:
 - Sexual assault cases where only digital penetration or penile penetration without ejaculation (or with use of a condom) occurred or when only oral assault occurred.
 - Sexual assault cases where the perpetrator has a low sperm count or is vasectomized.
 - Fingernail clippings from female victims, especially homicide victims, when it is expected that the perpetrator was male and that some sort of struggle may have occurred.
- Cases where a reference sample from a male victim or suspect is unavailable, but a sample from a male relative from the same paternal line is available.
- May be considered for use on cold cases that were previously unsuccessful with standard DNA typing. Please check with the lab that conducted the original testing. The original DNA extracts and/or additional suitable evidence items from the case must be available.

Limitations:

- All males with the same paternal lineage will have the same profile and thus will be indistinguishable from one another (i.e. a Y-STR profile is not unique and cannot identify a specific, single individual).
- Y-STR profiles are not eligible for CODIS so relevant reference samples must be submitted for comparison to any profiles generated before the testing will be attempted.
- Statistical weight of a Y-STR profile is significantly lower than standard DNA testing, so all other samples in a case that are potentially suitable for standard DNA testing should be exhausted before Y-STR testing is attempted.

The Washington State Patrol Crime Laboratory does not currently offer mini-STR typing, mitochondrial DNA typing (mtDNA), single nucleotide polymorphism (SNP) technology, animal DNA typing, or plant DNA typing. The WSP laboratory should be contacted if any of these services are required, and arrangements can be made with a federal or private laboratory to provide these services. Cases that meet certain circumstances may qualify to be worked by a federal agency or a private lab at no cost to the submitting law enforcement agency.

BIOLOGICAL EVIDENCE UNIVERSAL PRECAUTIONS

ALL EVIDENCE ITEMS SUBMITTED FOR BIOLOGICAL TESTING MUST BE HANDLED USING UNIVERSAL PRECAUTIONS

The handling of biological fluids and stains presents hazards due to the possible presence of pathogens. Investigators (and other personnel transporting biological material) must use universal precautions (i.e., treat all evidence objects as sources of pathogens and take appropriate protective actions) when processing or transporting evidence.

Gloves must always be worn when handling potential biological evidence. Gloves must be changed frequently and always between handling evidence items (to avoid contamination between items). Additional personal protective equipment including Tyvek[®] suits, boot covers, masks, etc. may be needed to protect the collector and/or the potential biological evidence. No smoking, eating, or drinking, should be done around potential biological evidence items. Talking over or around potential evidence (such as cell phone conversations) should be avoided. Coughing, sneezing, or spitting around biological evidence should also be avoided.

Good personal hygiene must be observed. The hands should be washed thoroughly after the removal of protective gloves, even if the gloves are not cut or punctured. Used protective gear should be removed when exiting the crime scene and must be disposed of in a manner specified by your agency's Exposure Control Plan and health and state regulations. Please consult your agency Bloodborne Pathogens Exposure Control Plan, which is required by WISHA (Washington Industrial Safety and Health Act).

Any questions regarding health and safety should be directed to local health authorities or to the Industrial Safety and Health Division, Department of Labor and Industries, Olympia, Washington, at www.lni.wa.gov; Safety and Health Hot Line, 1-800-423-7233.

COLLECTION, PRESERVATION, AND SHIPPING OF BIOLOGICAL EVIDENCE

Collection

Evidence may be recovered from many sites: from the crime scene, from an evidence dump site, from a vehicle involved in the crime, from the suspect's body and clothing, and from the victim's body and clothing. In sexual assault cases, evidence such as penile swabbings from a suspect, the suspect's underwear (for victim's DNA), and fingernail/tip samples may be useful evidence. When appropriate, as much evidence as possible should be collected as quickly as possible from the bodies of the victim and suspect. Transitory evidence should be collected as the first priority. Biological evidence is fragile and can easily be destroyed. The recognition and recovery of such evidence must be performed properly by the investigator in order to make the best use of it. Please call your local laboratory for case specific recommendations.

The DNA laboratory should be contacted before any biological evidence is delivered for processing. The first submission of DNA evidence is limited to five items plus reference samples. The laboratory can help determine what evidence should be delivered and how that evidence should be processed to provide the best forensic examination possible. When several forensic disciplines are involved with one item of biological evidence, the item may be shipped between WSP laboratories for the examination to be completed in the appropriate order for that item (e.g. latent prints).

It is imperative that the victim receive immediate medical attention. Promptness of an examination will also permit medical personnel to retrieve any physical evidence before being lost through washing or cleansing. Commercial kits are available to assist the attending medical personnel in collecting specimens and controls required by the crime laboratory. The examination should be conducted in a manner which avoids the loss of evidence. The preferred sequence of the examination by medical personnel is to first examine and collect the clothing, then the external areas of the body, and finally the internal areas of the body.

The Harborview Center for Sexual Assault and Traumatic Stress has established guidelines for sexual assault medical evaluations and evidence collection for adults and adolescents. Please see the [Harborview](#) SANE Guidelines (Adult and Adolescent Sexual Assault Medical Evaluation) for more information. For evidence collection related to sexual assault: Sexual Assault Evidence Packaging Handbook.

There are generally three methods of collection recommended by the WSP Crime Lab.

- 1) Collect the entire item.
- 2) Collect a portion of the item.
- 3) Remove the biological material from the item.

Collecting the entire item

The best way to collect an item of biological evidence is generally to collect the entire item. This method of collection allows the laboratory to process the evidence with the potential involvement of several forensic disciplines (e.g. latent prints, materials analysis). It is critical to collect articles of clothing worn immediately after a sexual assault in which the suspect has deposited body fluid evidence on the victim. These may not be the clothing the victim wears to go to the hospital. In some cases it may be important to collect the clothes the suspect was reportedly wearing at the crime scene.

Collecting a portion of the item

If the entire item is not able to be collected because the item is too large (e.g. walls, concrete, flooring), a portion of the entire item may be removed. This method is preferred if it is necessary to preserve a stain pattern on a large item. A large enough area around the stain/pattern should be taken to avoid having the cutting instrument come in close contact with the biological material.

Removing the biological material from the item

Visible staining: If the item (or a portion of the item) is not able to be collected, the visible stain may be transferred off the object by swabbing(s) or scraping.

- **Swabbing:** Moisten a sterile cotton swab with clean water* (not dripping wet, just moist enough to dissolve the stain) and rub the stain. If the stain is small, collect it on a small area of the swab. Collect larger stains on as many swabs as necessary. Use a dry swab afterward to collect any remaining residue. If a moistened swab(s) is used, let it air dry.
- **Scraping:** This should be performed as a last resort since flakes can create contamination. If the body fluid can be easily flaked off a surface, use a new/sterile scalpel or razor blade and scrape it onto a clean piece of paper. If more than one stain is to be collected, use a new/sterile blade for each scraping to prevent cross-contamination. Fold and tape the paper closed.

Non-visible biological material: If the item (or a portion of the item) is not able to be collected, but a non-visible stain or cellular/contact material is suspected to be present, the area may be swabbed. Latent print analysis may need to be considered before an area is generally swabbed**.

- If the stain is not visible or to collect cellular/contact material from an item, moisten a sterile cotton swab with clean water* (not dripping wet) and swab the area on the item. Use a dry swab afterward to collect any remaining residue. This technique is referred to as the “wet/dry technique”. If a moistened swab(s) is used, let it air dry.
- The wet/dry swabbing technique should be used for swabbing areas on the body that may have been licked, kissed, or bitten.

Lotions or lubricants: Collect large deposits of oils, lubricants, creams or ointments in a glass test tube or vial. Otherwise, wipe the area of the deposit with a sterile damp swab(s) and follow it with a sterile dry swab(s). Sterile gauze may also be used to collect the deposit. A substrate control may be collected from a deposit-free area, adjacent to the deposit.

*It is always preferable to use sterile, deionized water to moisten swabs. If this is not possible, clean water should be used. Commercially bottled water may be an appropriate option. A control swab, moistened with the water used then air dried, may be collected, however these controls are not generally processed at the crime laboratory.

**For collection of evidence that yields limited DNA, such as touch/handler/wearer cellular samples and small stains, certified DNA-free swabs should be used. Swabs labeled only as ‘sterile’ may contain contaminant DNA from the manufacturer and can produce DNA profiles that are not forensically significant. For further information on certified DNA-free swabs, contact the crime laboratory.

Preservation

Bacterial action, mold, sunshine, moisture, and warm temperatures can damage the evidentiary value of biological evidence due to the damage or destruction of DNA.

Proper packaging:

- Each item, including each article of clothing, should be packaged separately. Transference of materials between items must be avoided.
- Use clean paper bags, envelopes, cardboard boxes, or some other breathable packaging material to package evidence to avoid the accumulation of moisture inside the package. Do not use plastic bags or containers. The presence of moisture enhances bacterial growth.
- Comforters, blankets, pillows, coats, and other large items should be packaged in a way that allows them to be repackaged easily at the end of the forensic examination.
- Label each item with a case number, item number, date, item description, source and/or location.
- Evidence tape or other nonremovable tape should seal any openings. Initial across the tape. The date may also be appropriate to add across the seal. All packaging should have tape over any openings to ensure that small particles are not lost. Only tape or self-adhesive seals should be used. No envelopes should be licked to seal.
- Evidence must be properly packaged and sealed to prevent any loss or contamination.

Proper drying:

Evidence items, stains, and swabs must be thoroughly dried at room temperature without the use of heat. Partially dried items will be subject to bacterial action and mold, destroying their value as evidence.

Generally the best way to preserve biological evidence is dry and frozen. Although freezer storage is preferred, DNA typing results can be obtained from properly dried evidence stored refrigerated or at room temperature for an extended period of time. If freezing is not an option, biological evidence should be stored in a cool, dark, and dry place. Some items that require special packaging consideration are:

- Bottles/containers with liquid: The liquid should be removed using a pipette or by poking a hole in the bottom of the receptacle. Liquid should not be dumped out due to potential biological evidence around the opening/lip/mouth area of the container. The removed liquid may be preserved in a sealable plastic container.
- Condoms: For condoms with a small amount of liquid, the liquid should be allowed to dry before packaging. If the liquid cannot be dried, the condom should be packaged so that the liquid cannot spill out of the condom. A new/sterile twist tie or clamp may be used so biological material from the inside of the condom is not mixed with the biological material on the outside of the condom. Secure the condom in packaging such as a plastic specimen jar or conical tube to keep it upright and leak proof, and then freeze the item.
- Metal objects/rocks: guns, knives, rocks, aluminum baseball bats, etc. should not be frozen, as condensation forms upon removal of these objects from the freezer. These objects should be stored in a cool, dark, dry place.

Shipping

Items must be packaged in a way that will allow them to be handled and transported safely. A few examples include:

- Knives/Firearms/sharp items: should be placed in a new cardboard box and secured with plastic zip-ties. (See the firearms section of this manual for shipping safety procedures for firearms).
- Glass: should be secured in a cardboard box, padded, marked “fragile” and “glass” on the outer packaging.
- Blood tubes: any glass tube packaged for shipping must be cushioned and protected from breaking (this includes tubes used to store sexual assault swabs). Wrap the tube in absorbent material (e.g., enough tissue paper or towels to absorb the contents if it should break) and place in a small, resealable plastic bag. Tape top edges together with evidence tape. Place the bag into a second bag and seal, and then place this into a Styrofoam mailing container and seal container. Styrofoam containers are commercially available. Blood tubes should never be frozen, they may be refrigerated. If liquid blood tubes are included in the sexual assault kit, they should be removed when the kit is placed in freezer storage.

Items should not be marked “biohazard” or “blood” on the outer packaging for shipping.

REFERENCE/KNOWN SAMPLES

A reference/known sample is taken from an individual under supervised circumstances. A chain of custody must be maintained on the sample from the time of collection. The DNA typing profile obtained from the reference sample is compared to any profiles from the evidence items. The reference sample may be collected by law enforcement, medical staff, or correctional staff. Offender DNA collection kits supplied by the WSP CODIS Crime laboratory should not be used for the collection of DNA reference samples involved in criminal cases. The reference sample should be shipped to the WSP laboratory doing the analysis on the evidence items in the case. Reference samples that arrive separate from and later than the other evidence may cause a delay in the processing of the case. If reference samples are not submitted

with the initial laboratory request, the request may be cancelled unless other arrangements have been made in advance or sufficient justification is provided on the *DNA Case Supplemental Information form*. “Sufficient justification” may include an inability to obtain reference samples.

A “secondary” reference sample is a personal item (e.g. toothbrush, hair brush, comb) that is believed to be from an individual. On rare occasions, this type of reference may be used when a “primary” reference is not available. Contact the crime laboratory for more information on submitting secondary reference samples.

The reference samples that should be submitted are dependent on the case circumstances:

- Reference/known samples should be submitted from the victim(s), and suspect(s).
- References may also be required for elimination purposes (e.g. a consensual partner of a sexual assault victim).
- In missing person’s investigations, references may be requested from family members. Family member reference samples submitted to a WSP Crime Laboratory shall be accompanied with a [Consent for Family Reference Sample Collection, Testing, and CODIS Entry](http://www.wsp.wa.gov/forensics/crimlabs.htm) form (available on the WSP CLD website: <http://www.wsp.wa.gov/forensics/crimlabs.htm>).
- If an evidence sample profile matches to an offender profile in the CODIS database providing an investigative lead, a reference sample will be requested to confirm the “hit.” The following are acceptable reference samples:

Methods of reference sample collection:

- A buccal (saliva) sample on swabs or FTA[®] paper* is the easiest method of collection for known/reference samples. When collecting a buccal sample, the individual’s mouth should be free of food, tobacco, and other substances. It may be appropriate to have the individual rinse and spit before the collection of the sample. The buccal sample can be collected by using 2-4 swabs. Rub and roll the swabs on the gums and inside the cheeks so that the sample collected has thoroughly coated the surface of the swabs. The swabs should be air dried and packaged for submission to the laboratory. If FTA[®] paper collection is also desired, the wet/moist swabs should be blotted and rubbed on the FTA[®] paper before the swabs are dried. The FTA[®] paper should also be air dried and packaged for submission to the laboratory. The swabs and/or the FTA[®] paper must be labeled with the name of the person from whom it was collected, or some case identifier to link the item to the individual.
- A blood sample on FTA[®] paper* may be collected. This type of sample is generally collected by medical staff using a finger lancet or blood draw. Liquid blood is blotted on the FTA[®] paper labeled with the name of the person from whom it was collected, or some case identifier to link the item to the individual. The FTA[®] paper should be dried and packaged for submission to the laboratory. This method of collection is recommended for a victim of sexual assault, especially when an oral assault is alleged.
- Liquid blood presents a biohazard for laboratory staff and is not a recommended method for reference sample submission. If liquid blood submission is the only available option, blood samples should be drawn into lavender-top tubes. (Grey-top tubes are used by the Toxicology lab for alcohol and drug screening. In some cases, typically vehicular assaults and vehicular homicides, you may need to collect blood samples in both types of tubes for separate submission to the crime laboratory and the Toxicology laboratory.). Both the tubes and the packaging must be labeled with the name of the person from whom the blood was drawn.

- Blood may be collected at autopsy. It is recommended that liquid blood be blotted on FTA[®] paper* for submission. If autopsy blood is not available or is in poor condition, other body tissues can be used for reference/known samples. The crime laboratory should be contacted for recommendations.

*FTA[®] paper is recommended for long term storage of reference samples. Other types of absorbent paper are acceptable, but not recommended.

RETURN OF ITEMS

All DNA work product produced during sample analysis, including remaining DNA extracts from evidence (reference DNA extracts will be discarded), microscope slides, and sample cuttings or cellular material not subjected to DNA extraction, will be returned to the submitting law enforcement agency in a new, separate item. As part of the DNA work product, DNA extracts will be in a preserved format and can be stored at **room temperature** or lower.

The DNA Crime Laboratory Report will indicate the name of the new item in which DNA work product is returned.

If you have any questions, please call your local crime laboratory. Phone numbers can be found in the Introduction to the Guidebook (pages 8-10).

CODIS PROGRAM

THE COMBINED DNA INDEX SYSTEM (CODIS) PROGRAM

The Washington State Patrol Combined DNA Index System (CODIS) is composed of different categories (or indexes) of samples, including:

- Offender: contains DNA profiles of Washington convicted offenders.
- Forensic: contains DNA profiles generated from crime scene evidence.
- Missing Persons: contains DNA records of missing persons and deduced missing persons.
- Relatives of Missing Persons: contains DNA records from the biological relatives of individuals reported missing.
- Unidentified Humans: contains DNA records from recovered living persons (e.g. children who can't and others who can't or refuse to identify themselves) and recovered dead persons (including body parts and tissues) whose identities are not known.

DNA casework analysts contribute the DNA profiles for all indexes except the Offender Index. If a DNA profile is generated from an evidence sample submitted to any of the DNA casework laboratories, it will be searched against the database if appropriate. The database searched (national- or state-level) will depend on the relevant NDIS Procedures and WSP CODIS Procedures in effect at the time the profile is initially entered. If the database eligibility requirements change after a profile is initially entered, profiles may be moved from one database to the other, or removed from the database entirely. If removal occurs, the submitting agency will be notified. Samples eligible for upload to the state CODIS database are automatically searched against the appropriate indexes and may result in an investigative lead for the submitting agency. Investigative leads may be due to a profile in the Forensic Index matching another Forensic Index profile (a forensic hit) or matching a profile in the Offender Index (an offender hit).

All fifty states, the District of Columbia, the U.S. Army Criminal Investigations Laboratory, and Puerto Rico submit eligible DNA profiles to the FBI-sponsored National DNA Index System (NDIS). DNA profiles at NDIS are searched on a regular basis against the appropriate indexes resulting in hits between WA State DNA profiles and profiles submitted by other NDIS participating laboratories across the nation. In addition to the indexes listed above, NDIS maintains additional indexes such as the Arrestee Index and Detainee Index which are populated by entities that have the legal authority to collect DNA samples from these individuals.

Offender DNA samples are collected by law enforcement agencies across the state using collection kits provided at no charge by the CODIS Laboratory. Washington State law allows for the collection of a DNA sample for any person convicted of a felony or any of the following non-felonies:

- Stalking
- Harassment
- Communicating with a minor for immoral purposes
- Assault 4 with sexual motivation
- Assault 4 where domestic violence was pleaded and proven
- Custodial sexual misconduct 2
- Patronizing a prostitute
- Sexual misconduct with a minor 2
- Violation of a sexual assault protection order granted under chapter 7.90 RCW
- Anyone required to register as a sex or kidnapping offender

- Failure to register

Offender DNA samples should be submitted to the CODIS Laboratory located in Seattle. DNA samples submitted for the purposes of entry into the Offender Index are not considered evidence samples and do not take the place of a suspect reference sample. Offender DNA collection kits should not be used for the collection of DNA samples involved in criminal cases. If reference samples for a criminal case are submitted using these kits, they may be rejected by the laboratory.

DNA profiles generated for the Offender Index are processed by the forensic scientists of the CODIS Laboratory in Seattle. Profiles generated for this index are entered into CODIS and searched against other appropriate indexes. Eligible offender DNA samples are also submitted to NDIS.

MATERIALS ANALYSIS

CHEMICAL ANALYSIS

The Washington State Patrol Materials Analysis Unit is also responsible for the analysis of chemical compounds and mixtures, including, but not limited to, seized drugs, clandestine laboratory evidence, explosives evidence analysis, fire debris samples, select poisons and toxins, and a variety of other types of physical evidence in which chemical and instrumental examinations may be required. Because of the wide variability in the complexity and types of evidence submitted in these cases, a single approach or set of methods and procedures may not adequately address all types of chemical analysis casework. However, for most cases submitted, the procedures listed below are routinely employed by Crime Lab personnel. Non-routine cases may require the modification of listed procedures or research into the establishment of new procedures. Should this happen for a particular case, it will be described in the resulting Crime Lab report.

SEIZED DRUGS

Seized drugs analysis typically involves the qualitative examination of suspected drug evidence to determine if the material does in fact contain a controlled substance, and if so to identify that substance to the exclusion of all others.

Seized drugs are a major part of the crime laboratory caseload. They are physical evidence not only in illegal possession and sale cases, but also in such varied crimes as burglaries, traffic fatalities, and assaults. For efficiency and accuracy, it is imperative that the evidence be selected, packaged, and forwarded in a careful manner.

Precautions

- Do **not** submit any hypodermic needles, razor blades, or other sharps. Syringes will not be accepted except with prior approval by the laboratory manager. The crime laboratory will not accept any case that includes a needle alone or a syringe with the needle attached.

NOTE: The cutting or shearing of a needle from a syringe is prohibited by federal and state regulations. [WAC 296-823-14010 and WAC 296-823-18030]

- Many drugs are very potent, and even minute amounts present a health hazard. Do not taste or hold the suspect material close to the nose in order to smell it. Do not eat, drink, or smoke while handling the material.
- Be sure to exercise good personal hygiene when handling suspected substances by washing the hands thoroughly using soap and water after handling, even if direct contact was not made. Hand sanitizer is not effective in these situations. Use appropriate personal protective equipment (PPE).
- Small amounts of material must be handled with care to avoid contamination and loss.
- If green or wet plant material is stored in plastic or vapor tight packaging, biological degradation may result in decomposition which would preclude analysis of the sample. Dry thoroughly, if possible, and package in paper containers.

Significance

Plant Material

Marijuana (Genus Cannabis)

The definition of marijuana changed with the implementation of I-502 to state “marijuana” or “marihuana” means all parts of the plant Cannabis, whether growing or not, with a THC concentration greater than 0.3 percent on a dry weight basis. The law further states “THC concentration” means percent of delta-9-tetrahydrocannabinol content per dry weight of a part of the plant Cannabis, or per volume or weight of marijuana product. However, the State of Washington’s definition of marijuana is not aligned with that of federal law, international legislative bodies or the scientific community. International methodologies for determining THC concentration determine the total THC content and WSP CLD will also be reporting total THC (see below).

Plants of the genus cannabis can be thought of as two distinct varieties – those grown for their fiber content and those grown for their physiological properties. Plants grown for their fiber content are generally referred to as hemp while those grown for their physiological properties are referred to as marijuana in North America or herbal cannabis in Europe. Morphologically these plants are virtually indistinguishable from one another though the chemical composition of the plants allow for their distinction.

While eighty-five different cannabinoids have been identified in cannabis plants, it is primarily one compound, delta-9-tetrahydrocannabinol (THC), which has psychoactive properties. Tetrahydrocannabinolic acid (THCA) is the biosynthetic precursor to THC. THC levels in fresh plant material, regardless of variety, are quite low and the conversion of THCA to THC occurs during drying and with exposure to light and/or heat. Marijuana use by smoking or addition to baked products will also convert THCA to THC. Hemp plants contain a low concentration of THCA and therefore THC. To account for this conversion, the hemp industry has established legal acceptable levels for total THC that reflect the combination of THCA and THC (0.2 percent in Europe; 0.3 percent in Canada). Hemp industry standards require frequent testing to ensure compliance with these limits. The United Nations Office of Drugs and Crime (UNODC) and Health Canada have oversight of the testing methodologies to ensure compliance with the total THC limits in the European Union and Canada respectively. These methods call for the quantitative analysis of total THC using gas chromatography.

Gas chromatography (GC) is an analytical technique used for quantitative analysis which exposes the sample to high temperatures resulting in the conversion of THCA to THC. High pressure liquid chromatography (HPLC) is another analytical technique which can be used to quantify THC and does not utilize high temperatures thereby reducing the likelihood of THCA conversion to THC.

The legal limit for recreational possession for any person twenty-one years of age or older without a medical marijuana authorization is:

- One ounce of useable (leaf) marijuana;
- Sixteen ounces of marijuana-infused product in solid form; or
- Seventy-two ounces of marijuana-infused product in liquid form.
- Seven grams of marijuana concentrate.

The legal delivery by a person twenty-one years of age or older to one or more persons twenty-one years

of age or older, during a single twenty-four hour period for noncommercial purposes is:

- One-half ounce of useable marijuana;
- Eight ounces of marijuana-infused product in solid form
- Thirty-six ounces of marijuana-infused product in liquid form; or
- Three and one-half grams of marijuana concentrates.

The table below lists the types of marijuana cases the Crime Lab will accept for analysis:

	Under the age of 21	21 and older
Leaf Marijuana	All	Exceeding maximum amount allowed*
Marijuana Concentrates (hash oil, wax, shatter)	All	Exceeding maximum amount allowed*
Marijuana Infused Products in Solid form	Offenses on or after July 24, 2015	NONE
Marijuana residues (smoking devices)	All	NONE
All manufacturing and delivery cases, except marijuana infused products in solid form cases		

*Requires THC quantitation. Leaf marijuana and marijuana concentrate items for those under 21 with offense dates before July 24, 2015 also require THC quantitation.

Because of technical complexity and costs, the Crime Laboratory Division will not provide THC quantitation analysis for marijuana-infused products in solid form. The Toxicology Division provides analysis for evidence submitted in liquid form. Effective July 24, 2015, infused product cases related to minors don't require THC quantitation. We will accept cases of marijuana-infused products in solid form involving those under the age of 21 and perform a qualitative analysis for offense dates on and after July 24, 2015. Please contact the Toxicology laboratory for marijuana-infused products in liquid form.

For all other suspected marijuana-infused product in solid form cases, please refer to outside laboratories approved by the Liquor and Cannabis Board (LCB). A list of these labs is located at the LCB website: <https://lcb.wa.gov/>.

NOTE: Shipping marijuana across state lines is prohibited, and no analytical labs can accept cases from out of state because marijuana is still a Schedule 1 controlled substance according to Federal statutes.

A six week minimum lead time is required for all marijuana cases requiring THC quantitation. Please keep your local crime laboratory informed of all rush court dates to facilitate the timely analysis of marijuana cases. Marijuana cases requiring THC quantitation may be forwarded from your local laboratory to another laboratory in the Crime Laboratory Division for analysis.

The Crime Laboratory Division will not provide analysis of marijuana or marijuana products related to Civil Infractions.

Measurements of the height and diameter of the plant to establish if a plant or clone is immature will not be conducted by the Crime Laboratory. These measurements need to be taken in the field before collecting and/ or packaging of the sample.

Other Plant Materials — Other plant materials include psilocybin mushrooms, opium poppies, khat, peyote and “Spice” (drug substances sprayed onto plant material).

Solid Dosage Forms and Powders

Solid dosage forms of evidence include pills, powders, tablets, chunky material, tar-like substances and blotter paper. Drug paraphernalia includes pipes, measuring scales, balances, sifters, bowls, spoons, and a variety of other objects used, or intended to be used, with seized drugs.

Liquid Samples

Liquid samples include contents transferred from syringes, injectable solutions and steroids, some precursor materials, and other controlled substances.

Collection and Packaging

- Make sure each item is contained within appropriate packaging before sealing in the final evidence envelope or container. Do not put loose powder, tablets, or any other small or breakable objects directly into the final evidence envelope. This packaging should include the case number, item number, officer’s initials, and date. Make sure the outer envelope or package containing the item(s) is sealed and labeled properly.
- Suspected fentanyl should be packaged in a paint can or other hard sided container to prevent exposure due to accidental breach of the packaging material. Evidence confirmed to contain fentanyl will be returned to the submitting agency in paint cans or other hard sided containers clearly labeled as containing fentanyl.
- Liquids should be stored in vials or bottles with secure, non-leaking lids. Glass vials with Teflon sealed caps are recommended. Plastic flip-top vials are good for small quantities. Vials and bottles should be packaged to prevent breaking. As with all other types of evidence, the items should be sealed and labeled properly.
- **Plant Material**
 - Suspected khat (which contains cathinone and/or cathine) should be frozen immediately and delivered to the laboratory in a manner that minimizes thawing. Call the laboratory if you have any questions.
 - For marijuana and other plant material, completely dry the plant material at room temperature. Fans should be considered if air circulation is poor. When vegetable material is dried thoroughly, place in a paper sack, box, or paper envelope. Avoid loose mesh bags as contents (plant particles and fragments, dirt, etc.) may sift through the mesh holes. Do not place the dried plant material in a plastic container or a plastic-coated container. If not dried and packaged properly, the material may degrade and interfere with or prevent any analysis. Please do not submit wet plant material.
 - If a large amount of plant material is confiscated, it is not necessary to send all of it to the crime laboratory. A representative sample of the plant material should be selected and

dried, if necessary, and sent to the crime laboratory. Careful notes should be taken as to the total amount (weight) of material confiscated and the amount and locations of the sampling. Contact the crime laboratory for assistance if there is a question as to how to take a representative sample or the amount of the sample to be collected.

Field Tests

- Drug field test kits are **presumptive** tests (i.e., a positive result indicates a possibility that the substance being tested for is present). They are **not** conclusive tests which prove the presence or absence of a particular drug. These kits are useful in establishing probable cause and enabling the investigating officer to obtain a search warrant or an arrest warrant. Some field tests have been shown to give false positive results, indicating the presence of one type of drug when in fact another type is actually present.
- If the amount of suspected material is very small, a field test may consume too much of the sample and prevent further testing by the crime laboratory. In such cases, it is best not to perform a field test, but to send the material to the crime laboratory for analysis.
- **Do not** send the used drug field test kit to the crime laboratory—the reagents are corrosive and likely to spill during shipping; the resultant colors fade and are not recognizable. The crime laboratory will carry out a full analysis and report on their findings for your evidence.

Procedures for Drug Evidence Retrieved from Body Cavities

Drug evidence recovered from anal, vaginal, and oral cavities presents a serious health hazard to both law enforcement and crime laboratory personnel. To keep these personnel from being placed in jeopardy, the Crime Laboratory Division has instituted procedures affecting law enforcement personnel for dealing with this type of evidence.

Seized drug evidence removed from a body cavity is usually packaged in some type of protective material, such as a balloon, condom, or plastic bag. Certain steps need to be taken to decontaminate the outside of this container, both to protect personnel from biohazards and to eliminate malodorous decomposing bodily substances.

The following procedures must be used for decontaminating evidence before packaging as described above:

- Place the evidence (in its protective material) in a container of fresh bleach solution (1 part household bleach and 10 parts water) and soak for at least 15 minutes. Rinse thoroughly with running water. Dry carefully with a paper towel. Place in a clean container and label the container "From Body Cavity" and "Soaked in Bleach Solution." The cleaned container may be submitted to the crime laboratory for examination of the contents. The clean container will not require a biohazard label.
- If you have reason to believe that the wrapped evidence may leak and be attacked by the bleach solution, do not use the above method. If possible, transfer the suspected controlled substance to an appropriate container before shipping or call the crime laboratory for an alternate procedure.
- Be sure to note on the laboratory request form AND on the evidence packaging that (1) the item of evidence was removed from, or suspected of being from, a body cavity, and (2) that it was soaked in bleach solution to render it in proper condition for submission.

The clean container will be safe for handling by law enforcement personnel who must come into contact with, transport, and store the evidence. Disposable gloves and other personal protective equipment should be used while handling the contaminated container. Do not contaminate the outside of the clean container.

Seized drug cases involving evidence found to be removed from a body cavity and not properly processed before being submitted will be returned to the law enforcement agency without further examination.

If there is any difficulty or question regarding the above procedure, contact the crime laboratory before processing with the bleach solution.

Submission

- Use the [Request for Laboratory Examination](#) form (3000-210-005).
- Make sure to list the items in order of priority (i.e., the order in which you want the items to be examined). Specifying the probable cause item is recommended.
- Write the item numbers clearly.
- Do not list substances as a particular drug. Instead, list substances as "suspected cocaine" or "suspected of containing heroin."
- The Crime Laboratory will report measurement uncertainty for weights associated with marijuana statutory limits. If measurement uncertainty is required for the weight of other substances, this must be noted on the request for laboratory examination.
- Describe any special precautions to be taken, such as suspected to contain fentanyl/fentanyl analog, biohazards or future latent print examination.
- **Disposal of Seized drugs:** The crime laboratory does not destroy or dispose of any seized drugs or any other submitted evidence, even if it is determined not to contain a controlled substance. All submitted evidence—except that which was consumed in the analysis—will be returned to the submitting agency.

CLANDESTINE LABORATORY ANALYSIS

Clandestine (clan) lab case samples may contain a variety of liquids, solids, pure reagents, reaction mixtures, extracts and waste chemicals. Samples will normally be collected at the scene in duplicate to ensure that sufficient samples are available for reanalysis if required; therefore, only one sample vial set needs to be submitted to the Crime Lab for examination.

Generally, the first step in the analytical process is the identification of relevant chemicals in a sample. In general, a successful chemical identification strategy will utilize two or more techniques which lead to the same conclusion and preclude a false positive identification. The analysis of clandestine laboratory evidence utilizes a variety of instrumentation, including but not limited to, GC, GC-MS, FTIR, Raman, CE, X-Ray Fluorescence (XRF), and Scanning Electron Microscopy/Electron Dispersive X-ray Detection (SEM/EDX). Additionally, non-instrumental tests such as flame tests, color and precipitation tests, and microcrystal tests will also aid a forensic scientist in the identification and characterization of clandestine lab evidence.

Precautions

- List of DO NOTs

As soon as there are good reasons to believe a clandestine laboratory exists, the investigator must not enter the premises. If you have already entered, vacate the area immediately. Do not smoke. Do not turn any electrical switches on or off; leave them as they are. Do not shut off any running water. Do not pour any water on any equipment or material—some chemicals will burst into flame or explode when in contact with water. If equipment is operating or "cooking," leave it as is. Many of the chemicals involved are toxic, flammable, and even explosive. Because a suspected clandestine laboratory potentially contains many chemical and physical hazards, these sites are treated as hazardous material incidents and the safety rules governing their processing will apply. These rules are dictated by OSHA, WISHA and Washington State Department of Labor and Industries. Only those personnel who are trained and qualified to use personal safety equipment (hazardous material protective clothing, SCBAs and respirators) are permitted to work in this kind of environment.

- Call In Help

There are several well-trained teams throughout the state that have the expertise, equipment and necessary certifications to handle and process clandestine laboratories.

- Contact the **WSP Clandestine Lab Team**

The WSP Crime Lab has a team of chemists that are available to provide on-scene advice related to the clandestine manufacture of illicit substances. The chemists are available to provide advice related to safety, what samples to collect, type of process occurring, etc. The chemists are ***not*** available to collect and package evidence or to conduct a hazmat response within a scene.

If advice of a chemist is all that is needed, call the Crime Scene Response Team (CSRT) coordinator at (253) 255-3064 and request the assistance of a chemist.

If a full clan lab response by a qualified team is needed, contact WSP-SWAT.

WSP-SWAT consists of specially trained investigators who have the proper safety gear and equipment to enter and investigate a clandestine drug laboratory. While waiting for SWAT to arrive:

- Secure the surrounding area.
- Do not allow anyone to enter.
- Follow any instructions that the Team may provide.
- Treat the clandestine laboratory and surroundings as a crime scene.
- Any physical evidence—such as tire or foot impressions, fingerprints, records, and vehicles—must be protected for later evaluation and collection.

Significance

The objective in analyzing evidence from suspected clandestine laboratories is to determine if controlled substances had been, are being, or could be manufactured, the synthetic route utilized, and the production capacity. Evidence from a clandestine drug laboratory may include controlled substances, precursors, chemical reagents, solvents, by-products, and chemical waste.

The most common seized drug manufactured in clandestine laboratories in Washington is methamphetamine. However, clandestine laboratories involved in the production of other controlled substances including, but not limited to, 3,4 - methylenedioxymethamphetamine (MDMA), methcathinone, lysergic acid diethylamide (LSD), phencyclidine (PCP), phenethylamines, tryptamines, and other seized drug analogs, may be encountered.

Collection and Packaging

The collection of evidence at a clandestine laboratory focuses on documenting the chemical reagents and chemical hardware present. Samples need to be collected from reagents, reaction mixtures, and possibly wastes and residues for later analysis. An inventory of all laboratory related materials should be submitted to the crime laboratory along with the samples. This will enable the chemist to evaluate the method of manufacture used and potential production capacities.

In conducting an analysis of clandestine laboratory samples, very little material is actually needed. The only substances that should be collected in their entirety are suspected finished product or other seized drugs. Actual weights or volumes of the materials being sampled should be recorded. Estimates based on container size (such as “a one quart jar, half full”) are acceptable. Residues in filter papers may be collected by taking the entire filter paper or a representative number if there are several. All samples should be clearly labeled with item numbers.

Factory sealed reagents do not need sampling but should be photo documented and included in the inventory. All samples should be collected in duplicate and over-packed in separate metal cans with an absorbent material (such as kitty litter) for storage and preservation. One of the sample cans is submitted to the WSP Crime Laboratory and the other is stored by the submitting agency. Identification of what needs to be sampled is often difficult and best left to an experienced chemist if available.

Training in clandestine lab sampling may be provided to detectives who have taken an appropriate safety course. If you are unsure of how to handle any materials encountered in a clandestine lab, it is important to contact the crime laboratory and speak to a chemist.

Special Note on Handling Anhydrous Ammonia

RCW 69.50.440 relates to the possession of anhydrous ammonia for the intent of manufacturing methamphetamine. It is common practice for illicit drug manufacturers to take propane tanks and fill them with anhydrous ammonia. This compound is then used in the production of methamphetamine. Common propane tanks were never intended to store anhydrous ammonia. The fittings around the nozzle of the tanks are readily corroded by this compound, causing potential leakage of ammonia gas.

Proper training and safety equipment are needed to handle and test these tanks. **TANKS IN THIS CONDITION ARE A SERIOUS POTENTIAL HEALTH HAZARD – DO NOT SUBMIT THEM TO THE CRIME LABORATORY FOR ANALYSIS.** Contact your local Crime Laboratory or WSP-SWAT for information on preliminary testing and documentation. Disposal information can be obtained from the Department of Ecology (1-800-258-5990).

POISONS/TOXINS, SOLVENTS, INHALENTS, AND GENERAL UNKNOWNNS

Wide varieties of substances are of interest in criminal investigations and may be submitted to the crime laboratory system for analysis and identification. Materials that may be submitted can include unknown substances, which may be solids, single, or multi-phased liquids, organic or inorganic material, or any of a myriad of items. The request may be to identify an unknown material, identify a component in an altered material, to confirm the adulteration of one material by another or to compare two samples of evidential material which have not previously been compared.

The Crime Laboratory Division is not properly equipped to analyze many types of poison/toxin type cases. The Division lacks appropriate technology and/or methods of analysis, personnel expertise, safe facilities and sufficient training for the wide variety of potential toxins, poisons, biotoxins, neurotoxins, and other possible contaminants. Furthermore, these substances may endanger Crime Laboratory staff when accepted into the laboratory. **PLEASE CONTACT THE CRIME LAB BEFORE SUBMITTING THIS TYPE OF CASE.**

Precautions

Evidence from these cases may contain unknown materials that may present flammable, contact, and/or inhalation hazards in addition to any toxic effects. Acids and bases, which are very corrosive, may be encountered as evidence. Eye and skin protection must be used when handling these types of materials.

Tear gas products are irritants, by definition, and will cause physical discomfort if inhaled or exposed to the eyes.

Significance

The finding of the scientist's examination may give some possible results which include:

- Identification of an unknown material.
- Identification of the chemical components of a sample.
- Determination that there is no evidence of a suspected contaminant.
- Inconclusive results from which no conclusion can be drawn.

At times, it may be possible to develop a list of possible sources or uses of the identified components. Though identification may not be achieved, useful or investigative information will be included in the report whenever possible.

Collection and Packaging

Samples must be packaged appropriately to preserve the sample and reduce exposure to personnel handling evidence. Packaging should be selected which will not degrade due to the nature of the sample (i.e., acids will react with metal containers and may form harmful chemicals).

Food items should be frozen, or at a minimum refrigerated, to reduce decomposition of the sample. Generally these items need to be submitted as soon as possible to the crime laboratory for analysis.

Many of the collection and packaging techniques listed for fire debris evidence can also be utilized for solvents, inhalants and general unknowns. It is especially important that any evidence suspected to be

volatile in nature be packaged in vapor resistant packaging such as paint cans, polyester bags or nylon bags that are properly sealed. Contact your local crime laboratory if there are any questions concerning the packaging of this type of evidence.

Submission

When cases are received with *specific suspected contaminants* suggested by the agency, Supervisors or Laboratory Managers will have the authority and flexibility to accept such cases if Crime Lab personnel have demonstrated experience and accepted methods for conducting such analyses. Agencies should contact their local Crime Laboratory with any questions prior to submitting such items. It may be necessary to refer the agency to another laboratory more fully capable of handling these analyses.

MATERIALS ANALYSIS

FIRE DEBRIS AND EXPLOSIVES

FIRE DEBRIS

Introduction

The primary role of the crime laboratory is to identify ignitable liquids or residues.

Precautions

- Contact the crime laboratory if there are any questions concerning the procedures for collecting and packaging fire debris evidence.
- Any liquid found may be ignitable; remember to handle with care.
- The analysis for ignitable liquids must not be delayed, since they may be lost through evaporation, weathering, or bacteriological degradation.
- Evidence suspected of containing traces of ignitable liquids must be packaged in vapor tight containers.
- Each container must be properly labeled and sealed. The containers must be sealed with tape extending across the top of the container and down the sides. The tape must be initialed so that the initials are across the tape onto the container.
- Do not place gloves used for collecting and packaging evidence in the evidence container.
- If possible, evidence containers should be stored in the freezer, or refrigerator if freezing is not possible, prior to submission to the crime lab. Submission of the evidence to the crime lab should be done promptly.

Significance

Laboratory examination of the evidence may reveal:

- The presence and nature of an ignitable liquid which may have been used to accelerate the fire.
- The manner and area where the fire was set.
- The connection of a suspect with the arson scene through comparison of ignitable liquids, trace evidence, and latent prints.
- The presence of another crime which the fire was planned to conceal, such as a homicide or fraud.

Collection

- Ignitable liquid residues (fire debris):
 - Locations: protected areas (under furniture, floor moldings and joists, in cracks); lower surfaces, since liquids flow downhill; porous materials (carpet and padding, wood); soil, unsealed concrete, flooring and sub-flooring.
 - Use of a vapor detector ("sniffer") or ignitable liquid trained K-9 may be helpful. Many ignitable liquids do not have a noticeable odor. Other solvents may be masked by the odor of burnt materials. The human nose loses its sensitivity to certain odors when exposed to large quantities of scents for an extended period of time.

- Methods: cut cross-section through and below suspect area or pour pattern, if possible. **Do not** use a gas-powered saw tool or generator near the sample area because contamination of the sample may occur. Sampling substrates which cannot be cut or removed may be accomplished with the use of unscented non-clumping kitty litter. Contact your local crime laboratory for guidance with this process.
 - Comparison Sample: a sample of the same substrate materials as the samples collected from the origin of the fire, but from an adjacent area without the suspected accelerant.
 - Sample collection amount: Do not fill sample container more than 2/3 full as the empty space is needed by the laboratory for vapor sampling.
- Ignitable liquids:
 - Locations: cans, bottles, porous materials, surface of puddles.
 - Methods: pipette, pour, or siphon into proper container; blot or skim surfaces with paper towel or gauze.
 - Labeling: Label the secured container properly and label as “fragile”.
 - Molotov cocktails:
 - Package ignitable liquid and wick separately from the bottle, jar, or glass fragments. If there is no visible liquid, the wick remains are more likely to contain residue than the glass.
 - If fingerprint examination is desired, the glass should be stored so it can dry out rapidly. Fingerprints are dissolved by ignitable liquids. Preservation of this evidence for fingerprints may prevent ignitable liquid analysis.
 - If there is insufficient liquid, seal the glass in a vapor-tight container. Separate the larger pieces, which are most likely to contain latent prints, for drying and fingerprint processing. If there is not enough glass to process for both prints and for liquid analysis, a decision must be made as to which of the analyses will be most beneficial to the case.
 - Label containers as fragile or as containing fragile material.
 - Burned, charred paper (for document examination):
 - Before proceeding, call the Forensic Questioned Documents Section at the Spokane Lab at (509) 625-5401 for instructions.
 - Handle as little as possible. Leave charred paper where found if in a box, drawer, or wastebasket.
 - If repackaging of charred paper is necessary, place them loosely in a rigid container lined with cotton. Use gloves so as not to leave your own fingerprints.
 - Hand-carry. Do not mail.
 - If an analysis for volatiles is desired, seal papers in a new, unused paint can. If other examinations are desired, call the crime laboratory immediately for instructions.
 - Label all containers as fragile.
 - Soil samples:
 - Freeze all soil samples after collection. Refrigerate if unable to freeze. Bacteria in the soil can destroy petroleum-based products; low temperatures will retard bacterial action.
 - Clothing and cloth:
 - Gloves, shoes, and pants are the most likely to have ignitable liquid stains and spills. If possible, retain all of the suspect's outer clothing.

- Package in the same manner as ignitable liquid evidence. **Do not fill the entire can with the garment;** cut the garment into pieces, if necessary. Leave at least 1/3 of the can empty for vapor sampling by the laboratory.
 - Clothing removed from a body needs to be frozen after packaging in a vapor-tight container.
 - Shoes are often too long to fit easily into a gallon-size can without significantly bending and/or distorting the sole. It is not known whether or not this will alter the individualizing characteristics of the shoe outsole. To avoid this possibility, seal shoes in a polyester or nylon fire debris bag.
- Solid accelerants:
 - Package in plastic or paper bags, metal cans, or if sharp or jagged edges are present, package in a rigid container that will not be punctured or torn. If the solid accelerants are found with petroleum products, call the crime laboratory for handling and packaging instructions.
 - Controls/Comparisons:
 - A sample of material from the fire scene which is identical to the evidence submitted but does **not** contain any ignitable liquid is necessary. This sample, called a **comparison sample**, is collected from an area adjacent to the area where the evidence is collected and must be uncontaminated by the suspect ignitable liquid.
 - **Control samples** are samples of known composition that are analyzed alongside test samples in order to evaluate influences from the sample matrix or packaging/collection material. Examples include an unused piece of gauze consistent with gauze used to mop up a suspected ignitable liquid or an unused paint can consistent with the cans used for evidence storage.
 - Locations: From a protected area in the same room as the fire origin, from the room next to the fire origin, or from outside of a clearly defined pour pattern.
 - Precautions: A comparison sample is easily contaminated by walking through a pour pattern and then through the control area; by water run-off; by condensation of a volatile substance which evaporated from another area of the scene; by using contaminated gloves, tool, or utensils to collect the comparison sample. It is difficult, if not impossible, for the investigator to always collect an uncontaminated comparison sample. To help avoid contamination, collect the comparison sample first, then the suspect sample.

Packaging

It is important that the correct container is used to package the evidence. It is best to keep a variety of containers in several sizes on hand. Ignitable liquid residue evidence should not be stored in plastic containers or containers with plastic lids. Nylon and some polyester bags are an exception when properly sealed and have been shown to be free of contamination. Products designed for packaging volatile evidence may be purchased from many evidence packaging supply companies. For additional information on packaging materials for volatile evidence, contact your local Crime Laboratory.

Screw-top glass vials with Teflon-lined caps should be used to hold liquids of larger quantities (more than a milliliter) and should be packaged so they remain upright. Kitty litter or other absorbent medium may be used to hold vials upright and absorb leaks.

Clean, paint-type, unused, metal cans are preferable for storing liquid residues. Paint cans should be filled between 1/3 and 2/3 full. Never fill the can completely as this requires the sample to be repackaged before vapor sampling by the laboratory.

- **Advantages:** Cans are easily obtained, inexpensive, unbreakable, available in various sizes, and almost always maintain an airtight seal. Lined cans may delay or reduce the development of rust on the can.
- **Disadvantages:** Cans may rust through, rather rapidly on occasion, and must be checked frequently. They are bulky and do not nest. Once sealed, the evidence cannot be readily inspected.
- Use a hammer or rubber mallet to tap around the circumference of the lid for a proper seal. Keep debris out of the sealing groove. Inspect the seal to make sure the lid is completely seated.
- Several local manufacturers sell these cans. When a batch of cans is ordered, it is a good idea to send the crime laboratory an empty control can for examination, especially if epoxy lined cans are used.

Polyester bags and nylon bags designed specifically for fire debris evidence (and other kinds of volatile evidence) are acceptable. Polyester bags must be heat-sealed. Nylon bags can either be heat-sealed or rolled three times and taped. When rolling and taping nylon bags, the tape must extend the length of the roll and wrap around to the other side of the package on both sides.

- **Advantages:** Bags are relatively inexpensive, easy to store, available in a variety of sizes, and are particularly useful for large bulky items. Evidence is readily visible.
- **Disadvantages:** Bags can be punctured by sharp objects from the interior and/or exterior during handling. Polyester bags require a heat-sealer (and source of electricity), and can be awkward at a scene.
- Polyester and nylon bags require special care to seal properly. The seal should be inspected closely to make sure it is complete and vapor tight.
- Properly sealed cans may be placed inside these bags if can rusting is a concern. Alternately, properly sealed polyester or nylon bags can be placed in metal cans to protect the bags.
- When a batch of polyester or nylon bags is ordered, it is a good idea to send the crime laboratory an empty control bag for examination to make sure the bags as manufactured are free from anything that might interfere with detection of ignitable liquid residues in samples.

Glass jars are not recommended.

- Jars are breakable, difficult to store, and may not provide a good seal.

Plastic resealable (ziplock) bags and garbage bags are not vapor tight and may contain contaminants. These types of bags are not appropriate for packaging volatile evidence.

EXPLOSIVES

Explosives Safety Checklist

The Crime Laboratories in Seattle, Tacoma, Spokane, and Marysville can conduct analyses of explosives evidence including post-blast debris, explosive material (see next paragraph), components of explosive devices, and deactivated explosive devices. Each of these types of evidence can provide information about how a device was made (or could have been made) and can also provide links to individuals of interest to an investigation. The manner in which this evidence is collected, packaged, and submitted to the laboratory is one of the most important factors that will determine how much information the laboratory can provide about the evidence.

Precautions

Laboratory personnel will not accept unexploded (intact) explosive devices, or large quantities (greater than 1 teaspoon) of explosives. If evidence is suspected of containing an intact explosive device, the submitting agency **must** contact the crime lab for instructions on submitting the evidence (See also under Collection and Packaging of Explosives Evidence below).

Significance

Unexploded devices, and the individual components of a device, will often provide the best evidence to link an individual to a bombing attempt. Fingerprints will often be intact, tape and glue will not have burned away, wiring and fusing will be undisturbed. In such cases, chemical analysis along with trace examination and fingerprinting or DNA analysis can provide a more complete picture of the device, and there is a much greater chance of connecting the device to an individual.

- **Bulk Explosives:** Bulk explosives may be single chemical compounds or they may be mixtures of substances that together are explosive. Explosives can be commercial or military products, or they may be homemade mixtures. Crime laboratory analysis of bulk explosives can identify the components of an explosive, and in some cases, provide information about the possible source of the explosive. In some cases, distinguishing characteristics of an explosive sample can be linked to explosives or individual chemicals in a suspect's possession.
- **Post-Blast Debris:** Debris from an explosion may be burned, buried in rubble, and/or scattered over a wide area. Pieces of an explosive device may be thrown very far from the site of an explosion. An extensive search of the surroundings and painstaking sifting through rubble may be required to obtain important evidence. This evidence may include fragments of the explosive device itself (e.g., pipe fragments, blasting caps, electrical components) or chemical residues deposited on objects near the explosion. Crime laboratory analysis can often determine what explosive material was used in the device, and may sometimes provide information about the general construction of the device, and how the device was initiated. In some cases, unusual or distinguishing characteristics of the explosive or the device can be linked to materials in a suspect's possession.
- **Components of Explosive Devices and Deactivated Devices:** Components of explosive devices may include tape, glue, containers, pipes, fuses, wires, blasting caps, clothespins, clocks, remote controls, etc. Many everyday items can be used in the construction of an

explosive device, and nothing about these items may be suspicious or sinister in itself. When found together with bulk explosives, or when found partly assembled, the particular combination of materials found may suggest how these materials might be combined in an explosive device.

Collection

Do not submit active devices to the laboratory. Active devices, including blasting caps, should be dismantled, deactivated, or discharged in some way before submission to the laboratory. Call your local bomb squad or the Washington State Patrol Bomb Unit to deactivate the device. Make note of what method was used to deactivate the device (e.g., water cannon, blown up with dynamite, etc.), and provide this information documented on the [Explosives Safety and Evidence Checklist](#) when submitting the evidence.

Packaging

Items with sharp or jagged edges should not be packaged in paper envelopes. Use sturdier containers such as clean metal paint cans.

Many explosives, particularly "high" explosives, contain components that are volatile and will evaporate over time. If it is suspected that high explosives (e.g. dynamite, nitroglycerin, C4, etc.) may be present, evidence should be packaged in a vapor-tight container. Clean metal paint cans or vapor-tight plastic bags (such as polyester or nylon bags) are suitable to preserve volatile evidence.

Submit only small amounts of bulk explosives. Be sure to include representative samples of the bulk material, especially if there are indications of mixtures. Typically a teaspoon of material is sufficient for laboratory analysis of bulk explosives.

Flash powder can be very sensitive and may ignite with a spark. If possible, package flash powder in anti-static plastic bags, made for use with static-sensitive computer components; or use paper packages, making sure to completely seal all openings and seams – flash powder is a very fine powder and will seep out of very small openings. Do not package bulk flash powder in metal containers or plastic bags not designed to be static-resistant. Submit only small amounts of flash powder. Typically a teaspoon of material is sufficient for laboratory analysis.

Whenever possible, submit control samples in a separate package along with the evidence. For example, if soil from a blast site is submitted, also collect a sample of similar soil from an area away from the seat of the blast. If a portion of rubber molding with blast residues is submitted, also submit a clean area of the molding. Package controls in the same manner as samples with residues – the manner in which a piece of material is packaged can affect the analysis (e.g., bacterial action in soil over time – See the trace materials packaging procedures.).

Porous materials or objects with cracks and ridges tend to collect a large amount of useful residues. Materials from near the blast site such as foam, rubber, pipe threads, cardboard, or any rough-surfaced items will often be useful items to collect.

If fingerprint analysis is desired, submit the items to the Materials Analysis section of the crime laboratory first. Indicate clearly that a fingerprint examination is needed. The crime laboratory can usually forward evidence to the latent prints section after the explosives analysis is finished.

Give the laboratory as much information as possible about the circumstances of the case. If evidence is from a blast scene, send pictures, diagrams, witness statements, officer's reports, etc. If a suspect has been interviewed or a premise searched, send information about what the suspect may have been involved with, including internet recipes, jars of chemicals recovered, statements from the suspect about what kind of device he was making, etc. The more information the laboratory has about the circumstances of a case or the source of a particular item of evidence, the better able the crime laboratory will be to help investigate an incident.

The person who collects explosives evidence must be free of contamination that might interfere with the investigation. If the individual collecting evidence has been involved with explosives recently, they should wear clean clothing including footwear. Hands should be washed and gloves should be worn. If very small amounts of explosives residues are involved, alcohol swabs and water swabs (with controls) should be taken of the evidence collector's hands and shoes, before any evidence is collected. Submit these swabs along with the evidence.

For larger scale incidents, assistance may be required from an agency with more resources at its disposal than any local agency or the state crime laboratories. For scenes beyond the capabilities of local responders or the laboratory, it may be necessary to contact your local BATF or FBI office. The BATF and FBI can provide scene response, investigative assistance, and laboratory services in cooperation with local agencies and the state crime laboratories. When in doubt, call the state crime laboratory, and a BATF or FBI field office.

Submission

In order to assure the safety of WSP CLD personnel and to be in compliance with applicable Federal Regulations, all potential unexploded explosives evidence must be delivered in person to one of the four CLD laboratories that perform explosives analysis. The Spokane, Marysville, Seattle, and Tacoma laboratories are the labs currently performing explosives examinations. Also, with any submission of explosives type evidence, complete and submit the [Explosive Safety and Evidence Checklist](#) along with the evidence and the Request for Laboratory Examination.

If any questions arise about evidence collection, packaging, submission, or about what services the laboratory can provide, call the state crime lab for assistance and advice.

IMPRESSION EVIDENCE

In the process of entering and leaving a crime scene, shoeprints, footprints, and tire tracks can be left behind. This evidence should be aggressively searched for at crime scenes and precautions taken to preserve it, for later documentation and collection. Sometimes overlooked as evidence, fabric impressions may be found in high impact “hit and run” incidents and impressions of weapons or other objects may be sometimes found in assault or homicide crime scenes.

Impressions examinations typically include a questioned evidence impression with a known source (shoe, tire, fabric, etc.). Sometimes there is only a questioned impression and the source must be determined. In these cases, impressions are also useful for investigative leads. SICAR (Shoeprint Image Capture and Retrieval Database) is a footwear database which contains manufacturer information including outsole patterns to aid in identifying potential make and/or model of footwear impressions recovered from scenes of a crime. Even partial outsole impressions with only a few design elements, shapes, or logo portions can offer enough information to provide a possible shoe make and model. Because recognition of the design is the key, rather than comparison of fine detail, even images of impression that were taken at an angle are valuable and should be submitted. Tire impression tread designs may also be search for potential manufacturer make and model in tire tread design guides, although the search is not as computer-assisted as with SICAR.

Latent fingerprints and palm prints are examined by the Latent Prints Laboratory and discussed in the [Latent Prints Section](#) of this document.

Tool mark impressions are examined in the Firearms section and are discussed in the [Tool Mark](#) section of this document.

Forensic odontology is not performed in the Washington State Patrol Crime Laboratory System.

Precautions

Care should be taken to preserve any trace evidence such as hairs, fibers, or paint in the impression.

Significance

Examination of impression evidence may reveal:

- The type of footwear or object that created the impression.
- Possible number of footwear and/or objects present
- If an impression was created by a specific shoe, tire, or other object.
- The approximate size of the object creating the impression.
- Manufacturing information about the shoes, tires, or other objects creating the impression.
- Order of deposition and possible movements/direction of travel.

Methods

- For all impression evidence, care should be taken to preserve trace evidence before any attempt is made to collect the impression.

- **Photography** – **ALL** impressions should be photographed first before using any other collection method. Keep in mind the following points:
 1. **Scale/Ruler** - Take photos with and without a scale/ruler. The scale must be in the same plane as the impression so that both are in focus simultaneously. It might be necessary to dig a trench next to the impression to be able to place the scale in the same plane as the impression.
 2. **Camera Quality** - Use a digital camera with high pixel resolution. Take both RAW and JPG format if possible. If not possible, take in RAW only. Phone cameras typically are too poor of a quality for use in comparisons. If using a film camera, be sure to use low speed film. High quality images (in RAW format) are required for comparisons. Lower quality images may be used for SICAR searches (RAW or JPG).
 3. **Camera Position** - Position the camera as close as possible to the impression (fill the frame with the impression). Use a tripod to hold the camera steady. Place the camera directly over (i.e. aimed directly at, straight onto, parallel to) the impression, not at an angle to the side so that the entire impression is clearly in focus and no size or focus distortions result.
 4. **Lighting** - Use oblique lighting which highlights the impression detail. Take several photographs moving the light source between frames to various positions around the sides of the impression. For dust impressions, the light should be low and grazing the surface. For three dimensional impressions, or deep impressions, use a detachable flash held at a 45° angle approximately three feet away from the impression. Take at least three photographs of the impression repositioning the flash around the sides of the impression.
 - For deeper three-dimensional impressions, take three additional photographs with the detachable flash at approximately a 65° angle in three positions around the sides of the impression.
 - For shallow three dimensional impressions, take three additional photographs with the detachable flash at approximately a 25° angle in three positions around the sides of the impression.
 5. **Enhancement** - Some impressions may be latent in part or whole and need to be chemically enhanced before correct documentation and collection is possible. If a latent impression is suspected, protect the impression area and contact the crime laboratory for instructions. Disturbing the area around the partial impression by placing scales or markers may alter detail that could be revealed upon enhancement.
 6. **Tire Impressions** - For long continuous tire impressions, place a steel tape measure along the length of the impression.
 - Take overlapping photographs along the impression for at least eight feet (approximately the full circumference of most tires). Overlap the photographs by approximately 2 inches.
 - With the long tape measure still in place, move a second small scale and tape measure along the length of the impression while photographing to ensure accuracy in sizing. The small scale should be on the same plane as the impression.

7. **Shoe Impressions** - When an entire footwear impression is present, photograph the full footwear impression. Then photograph sections of the impression, toe area and heel area, to achieve maximum resolution.
- **Intact Object** – Take photographs before removing the object. Whenever possible, the entire object which has the impression and/or has created the impression should be submitted to the laboratory. Positive identification of the source of the evidence is more likely when the original impression can be examined. The evidence has to be packaged in a manner which protects the impression from contact with any other surface (including the packaging, if the impression is fragile). Securing a small, open cardboard box over an impression can often keep the packaging from disturbing an impression.
 - **Lifting** – Take photographs before lifting the impressions.
 1. **Dry-Deposit Impressions** - In general, dry-deposit impressions (e.g. dust impressions) may be lifted with fingerprint tape, a trace evidence lifter, a gel lifter, or an electrostatic dust lifter. Do not dust a dry-deposit impression with fingerprint powder as the impression will be lost.
 2. **Wet-Deposit Impressions** – In general, wet-deposit impressions that stick to a substrate (e.g. dried mud impressions, tracks on a floor from a wet athletic shoe), may be lifted with a gel lifter or may be lightly dusted with fingerprint powder prior to being lifted with a gel lifter.
 3. **Gel Lifts** – Do not press gel lifters too firmly, or the impression will be distorted. Consider a black gel lifter if the impression is made with light colored particles, or a white gel lifter if the impression is made with dark colored particles.
 4. **Importance of Lifts** – Although impression evidence examinations can be done using only photographs (correctly taken), lifts or casts should also be taken. The important individualizing characteristics required to identify the source of an impression may not be visualized in a photograph. Contact the crime laboratory for assistance if you have questions.
 - **Casting** – Take photographs before casting the impression. Impressions in soil should be cast with dental stone (plaster should be avoided as it gives less detail and forms a softer cast). Impressions in snow and under water require special handling, and the crime laboratory should be contacted for instructions when these types of impressions are encountered. Although impression evidence examinations can be done using only photographs (correctly taken), lifts or casts should also be taken. The important individualizing characteristics required to identify the source of an impression may not be visualized in a photograph. Also, for impressions in soil and snow, there is three-dimensional information that is lost in photographs. **DO NOT** clean the cast prior to submission. Package it with any dirt/debris still adhering.
 - **Tire Exemplars** –
 1. Test impressions (exemplars), made with the object suspected to be the source of an impression, are generally made in the laboratory. Tire exemplars are the exception and may be prepared by the investigator due to the necessity of making the impressions while the tires are still on the vehicle. The Crime Scene Response Team is also available to assist in preparing these exemplars.

2. Tire exemplars can be made by preparing pieces of white poster board the length of one full rotation of the tire's circumference. A clean board is evenly rolled with black ink and the tire is rolled across this inked board. The tire is then rolled across a clean length of second poster board (also the length of the tire's circumference). The starting and ending position and the direction of the tire roll must be marked with chalk or crayon on the tire and the poster board. The tire information (position on vehicle, inside and/or outside edge, manufacturer, design name, size, and DOT serial number) should be written on the poster board. Be careful to prevent the rear tires from running over the front tire impressions. The vehicle may need to be turned slightly to prevent such an overlap. The tires may be submitted with the test impressions.

Sources of Impressions

- Just about any surface may have an impression, including soil, cement, flooring, wallboard, glass, bedding, etc.
- Clothing impressions on car finishes, bumpers, undercarriages, etc.
- Shoe impressions on the brake pedal in cars that come to a sudden stop.
- Tire impressions, including the manufacturer information on the sidewall, may sometimes be on the clothing in vehicle/pedestrian incidents.
- Shoe impressions in stomping cases may be on a victim's face and/or clothing.

Sources of Knowns

- Weapons or other relevant items
- Clothing – collect as an intact object
- Shoes – collect as an intact object
- Tires – collect tire exemplar prints
- SICAR or other searches for manufacturer information may produce a lead which points to a source for a known

Packaging

- Impressions and dust print lifts of impressions should be secured in boxes in a manner which prevents anything from coming into contact with the impression or lift. Plastic should never be used to package impressions or dust print lifts of impressions since the plastic can actually develop an electrostatic charge which can then remove portions of the impression or lift.
- Casts should be thoroughly air dried prior to packaging. Do NOT clean the casts. The cast should be cushioned and packaged in a cardboard box which allows the cast to continue drying. Never use plastic.
- All items should be clearly marked as to location, orientation to the scene, date, and agency information.

Images of the impressions are placed on a CD, DVD, or USB flash drive. Package the electronic medium in a letter size envelope and seal as an evidence item. Emailed images cannot be used as evidence in comparison to a known.

Submission

For comparison requests, the impressions and the possible sources must be submitted as separate items of

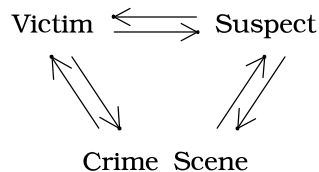
evidence – not in the same sealed package. The accompanying RFLE should state which items should be compared in the Special Instructions section.

For SICAR requests, the impressions may be submitted electronically. Only images with impression information should be submitted. The file size for an image, or the total of multiple images, must not exceed 25 MBs. Submit a completed RFLE and the images as attachments to: shoesearch@wsp.wa.gov. Any questions about this database can be sent to Jeff.Jagmin@wsp.wa.gov.

MATERIALS (TRACE EVIDENCE)

Small, often microscopic, quantities of material have always been of interest to crime scene investigators. These particles can be the key to a successful investigation. An individual or object leaves behind and/or picks up traces of materials from another person or an environment, however brief and slight the contact. This concept is referred to as Locard's Principle of Exchange. The materials are often referred to as trace evidence. These materials may be fragments of either manufactured products or naturally occurring substances. The sample of unknown origin is referred to as the "Questioned" sample. The sample of known origin (the possible source) is referred to as the "Known" sample.

The diagram illustrates the principle of the exchange of trace evidence between suspect, victim, and the crime scene. Notice that the arrows go in both directions. Other versions of this diagram could include multiple suspects, multiple victims, multiple crime scenes, and the addition of weapons.



Evidence that results from this exchange can suggest a link between the suspect, the victim, and/or the crime scene. The connection is established by the comparison of trace evidence from a questioned source with samples from a known source (reference/control). For example, in the case of a person being attacked in their home by an intruder, the intruder may leave hairs and fibers on the victim and on the victim's furniture or carpet. Likewise the intruder may take away hairs or fibers from the victim's residence on clothing or shoes. Lastly, since the intruder had to get into and out of the scene, there is a possibility of the intruder leaving shoeprints either in the house or outside of the house at a point of entry. If the point of entry was a window, there could be glass fragments on the suspect's shoes. If the point of entry was a painted door pried open with a crowbar, then paint from the door may be transferred to the pry bar. The timely collection of evidence is critical. This evidence should include the questioned and known (control) samples from the victim, suspect, and the crime scene.

The evidence may be classified by the type of material to be examined:

- Building Materials
- Fibers, Fabric, and Cordage
- Food, Gastric Contents, and Vomit
- Glass
- Hair
- Miscellaneous Materials
- Paint and Protective Coatings
- Tape and Adhesives
- Vehicle lamps
- Wood and other Botanicals

Each of these types of materials is described below. Each description of a material includes the types of services that may be conducted as well as recommendations for precautions, collection, and packaging. Not all services can be performed on all types of materials. In general, the types of services that may be conducted on these materials are: Classification/Identification of the Material, Comparative Associations, Physical Match, Damage Analysis, and Generation of Investigative Leads. These general categories of services are described as follows:

Classification/Identification of a Material

Classification and/or identification of a material can assist in determining potential sources when a known sample is unavailable. Glass can be classified as from either containers (e.g. bottles and jars) or from windows (e.g. vehicles windows, residential windows, business doors, etc.). Classification of fibers as potentially from a carpet, a rope, or clothing may be important when examining clothing recovered from underneath a vehicle.

Comparative Associations

The significance of a comparison of materials from a Questioned sample and a Known source is dependent on the type of material being compared and what is known about it. Questioned samples should be collected and packaged before Known samples. Fibers, glass, paint, and tape have been studied extensively for decades. Such comparisons cannot conclusively establish that the questioned sample originated from the same source as the known for any one material to the exclusion of all sources of similar manufacturing. The type of material, the number of characteristics evaluated, and the case scenario can indicate how much weight such a comparison can contribute in corroborating a version of events. The more materials included, the greater the significance of such comparisons.

Physical Match

Physical match examinations consist of the examination and comparison of broken, cut, or torn items to determine if two or more pieces were at one time one item. Materials submitted for a physical match examination can include broken glass (from burglaries, vehicle accidents, shootings, etc.), automobile parts from accidents, broken wood or metal (bats, sticks, architectural structures, etc.), paint chips, tape, wires, plastic bags, household items, and any other type of material/object that may be physical evidence in a criminal investigation. Do NOT attempt to fit pieces together. Prematurely “fitting” pieces together can alter and/or destroy fine tips, shards, detail, etc. on the side edges of the pieces. These features are an important part of the examination and can add significant weight to conclusions when they are present. Documentation of such features is needed before the final “fitting together” is conducted and documented.

Damage Analysis

How a material is damaged may provide information about how the crime occurred, and/or corroborate a version of events. For example, damage analysis of clothing may be able to determine if a hole was cut or torn. Examination of glass may tell whether a window was broken from the inside or outside. Damage analysis of window screen could tell whether a particular weapon could have been used to penetrate the screen.

Generation of an Investigative Lead

Analysis of materials may be able to generate an investigative lead. An original manufactured automotive paint chip can be searched against a database to generate a possible list of make/model/year vehicles as potential sources of that paint chip. Examinations of clothing can generate a list of particles present – including particles that may be related to work place settings and/or hobbies that can help narrow a list of suspects.

BUILDING MATERIALS

Building materials comprise a very large variety of particles. Primary and secondary transfer of building materials between individuals, tools, and weapons may occur during practically any crime. The examination of discharged bullets may help define bullet path including impact with intervening materials. Fibrous insulation, gypsum wallboard dust, cement, caulking, wood dust, etc. may transfer to a suspects clothing and hair during a burglary. Tools found in a suspect's possession may have building materials smeared or adhering to them which may offer important clues in an investigation. Motor vehicles involved in an accident may be an excellent repository of building materials from contact with an immovable object such as a concrete barrier or wooden utility pole.

Precautions

Asbestos has been used in a variety of older building materials. Care should be taken when collecting materials that appropriate precautions are taken if asbestos is suspected. Materials that may contain asbestos should be packaged in non-porous airtight containers such as arson paint cans. Please contact the laboratory for guidance prior to sampling.

Footwear impressions are often present in drywall dust and at construction sites. Be sure to read the Impressions section for proper preservation.

Significance

The examination and comparison of building materials may reveal:

Classification/Identification of the Material

- Origin of the material (e.g. roofing vs. insulation)
- Possible age of material or period of installation (e.g. asbestos products)

Comparative Associations

- A possibility of common origin if the questioned building material and control samples show similarities in physical and chemical characteristics.

Physical Match

- Two broken pieces were at one time a single object.

Damage Analysis

- Building materials such as wood or concrete may show evidence of damage sustained during forceful contact (e.g. hammer head design impressed into lumber along with a transfer of wood to hammer).

Generation of Investigative Leads

- Assist in bullet path reconstruction by an examination of material on bullets.

- Determination of hardened concrete usage and source of aggregate (e.g. concrete is manufactured with different ingredients depending upon end usage).

Collection

Methods

- Rigid Objects - For rigid objects, cut or saw a representative portion of the material (e.g. lumber, roofing, wallboard, floor tile, etc.).
- Friable Materials - For friable materials, sample by simply tearing, breaking, pulling, or picking (e.g. wall insulation).

Sources of Questioned Materials

- Bullets – collect bullets intact. Do not try to pry anything out of the nose. If the bullet is dug out of a substrate (i.e. drywall, wood, etc.), then collect the bullet and the substrate separately. The substrate will be considered a Known sample and the bullet will be a Questioned sample.
- Clothing - recover the clothing to be examined, taking care to avoid contamination and loss of trace evidence. Do not attempt to collect the trace material. Collect the clothing from different individuals [suspect(s) and victim(s)] in different locations and by different evidence technicians whenever possible.. Collect the outermost layer separate from the inner layers. Collect shoes separate from the rest of the clothing. Air dry clothing items at room temperature in a protected area and place a clean piece of paper over the item to protect against contamination while drying. Do not use fans to dry the items. Dry suspect's clothing in a separate location from the victim's clothing. Place the dry clothing, along with the paper used in the drying process, in a paper bag. Label and seal the bag.
- Tools – collect tools intact.
- Vehicles – collect particles and smears from both interior and exterior surfaces.

Sources of Known Materials

- Construction sites
- Any dwelling (e.g. single family home, apartment, commercial business, garage, etc.)
- Highway pavement, sidewalks, highway markers, utility poles
- Dry Wall – collect the clothing from different individuals [suspect(s) and victim(s)] in different locations and by different evidence technicians whenever possible. Collect the outermost layer separate from the inner layers. Collect shoes separate from the rest of the clothing.
- Submit control samples from each source of broken building material. If it is important to know whether the building material was broken from the inside or the outside, the submitted control fragments must be carefully marked as to the collection location and/or facing position. The crime laboratory must be consulted for details.

Packaging

- Materials found in different areas must be packaged separately.
- Clothing - Air dry clothing items at room temperature in a protected area and place a clean piece of paper over the item to protect against contamination while drying. Do not use fans

to dry the items. Dry suspect's clothing in a separate location from the victim's clothing. Place the dry clothing, along with the paper used in the drying process, in a paper bag. Label and seal the bag.

- Each of the recovered items must be packaged separately, properly labeled, and sealed. If a vehicle is involved, labeling should include the location on the vehicle, make, model, year, VIN, and license plate number. Containers must be sealed to ensure that no leakage occurs. Put the material into a folded paper packet, or paper container and label, and then place the packet into a second container, also labeled properly. Do not place moist building materials in plastic or glass containers. If the material is moist or wet upon collection, air dry completely and then package.
- Small Pieces - Small pieces of material should be placed in a paper fold, sealed, labeled, and packaged in a small rigid container (e.g., a pill box, metal vial). The container must also be sealed and properly labeled.
- Large Pieces - Large pieces of material should be packaged in rigid containers. Use packing material such as cardboard or part of a corrugated carton to avoid breakage and to protect the edges. Hand delivery is the preferred way to submit large pieces, as it avoids the task of extensive packaging and reduces the risk of breakage.
- Footwear and tire impressions are often preserved in fine powdery building materials such as wallboard dust. Package so overlying packaging material is not rubbing or smearing the impression.
- Tools with building materials must be protected to avoid loss or contamination. The area containing the material should be protected with soft tissue paper, and the tool packaged securely into an appropriate container (e.g., box).
- Package so that if a container opens or tears during shipping, the material is not lost and does not leak out and contaminate other evidence or pose a safety hazard.

FIBERS, FABRIC, AND CORDAGE

The transfer of fibers and fragments of cloth can be the result of such actions as violence to a person with a weapon or with a vehicle, clothing being snagged and/or torn, or the contact of clothing with another article of clothing. Comparison of questioned and control fibers and threads cannot conclusively establish that they are of common origin. However, the forensic scientist can determine the color, type, and generally the product use of the fibers. The types of fibers may be categorized by origin: animal, plant, man-made, mineral, or a mixture. Various product uses are garments, carpets, bedding, clothing, upholstery, etc.

Clothing damage assessment related to firearm's discharge is conducted in the Firearms/Toolmarks Unit of the laboratory.

Impressions of fabrics or other textiles are covered under the Impressions subsection.

Precautions

Fibers are not readily visible and may be transferred inadvertently by touching one object that has loose fibers and then touching a second object, leaving those fibers behind. Fibers can also become air borne, settling on surfaces that will subsequently contact other items.

Damaged regions of textiles are fragile and may contain microscopic particles transferred during the damage process. The condition of the damaged threads should be disturbed as little as possible to allow an accurate assessment of the damage and to preserve any transferred particles.

- Do not try to align damaged clothing or other textiles to each other.
- Do not touch damaged regions of textiles.
- Do not place objects (such as rods) into the damaged region.

See the *Collection* and *Packaging* procedures (below) for Fibers, Fabric and Cordage to avoid these issues.

Significance

The examination of fibers, fabric, and cordage may reveal:

Classification/Identification of the Material

- Typical end use or origin of the fiber or fabric (e.g. carpeting, clothing, ropes)
- Fabric construction (e.g. knit, woven, felted)
- Cordage type (e.g. twisted, single braid, double braid, kernmantle, etc.)
- Fiber types (e.g. cotton, ramie, linen, wool, nylon, polypropylene, polyester, etc.)

Comparative Associations

- Contact between two or more persons.
- Contact with objects such as blankets, upholstery, carpets, and drapes.
- Contact between a vehicle and victim. The fibers may be embedded on the exterior of the vehicle.
- Contact between the suspect and the crime scene.
- Contact of suspect's clothing and broken glass entry of residence.
- Presence of a person or object in a particular place.
 - victim clothing fibers in a suspect vehicle trunk or passenger cabin.
 - suspect residence fibers on a blanket used to wrap and conceal a victim.
 - suspect clothing fibers on a broken window pane.

Physical Match

- Two pieces of fabric, carpeting, or other textile were at one time a single object.

Damage Analysis

- Nature of damage to fabric (e.g. tearing, ripping, cutting, puncture, type of knife, etc.).
- Could a particular weapon be the source of the damage (inclusion/exclusion only).
- Could the damage be produced in the manner described by the suspect or victim?

Generation of Investigative Leads

- Who was driving at the time of the collision? Fibers may assist in locating the positions of persons riding in a vehicle, if the fibers are embedded or are firmly adhering to a surface. The fibers may be fused into plastic parts in the interior of the car or an airbag.

Collection

- Always photograph an item before altering it or collecting anything from it.
- Fiber evidence is easily and rapidly lost and should be collected as soon as possible with handling of the items kept to a minimum. Do not touch or insert objects (ie. trajectory rods, pens, or fingers) into damaged areas of a fabric.
- Items from different individuals (suspect(s) and victim(s)) should ALWAYS be collected and processed in separate areas by different evidence technicians whenever possible, or at separate times with an intervening thorough cleaning of the area.
- Loose fibers on the surface of an item are Questioned fibers. The fibers that comprise an item are considered Known fibers. These two should be collected separately. Collect the Questioned fibers BEFORE the Known fibers. Remember to look for all possible sources for the questioned fibers. That source may have fibers on it that could establish a two-way transfer.

Methods

- Intact Object – whenever possible, the entire object with fibers should be submitted. Any adhering trace evidence may then be recovered later in a controlled laboratory environment.

If the clothing or other textile must be dried before collecting or packaging the item, place a clean paper underneath the item to catch any evidence that falls during drying. Also place clean paper over the item to protect it from contact with other items or debris. If the article is hanging to dry, perforate the center of the paper with the hangar and drape the paper on either side of the hanging item. Allow the item to air dry at room temperature. Do not use a fan.

If fibers are imbedded in an object (such as an automotive dashboard or a painted car part), do not attempt to remove the fibers. If possible, submit the entire object or car part, or cut out the portion of the painted surface with the imbedded fibers.

If the item being collected is a rope or binding and it must be cut to remove it, choose an area away from any knots, if possible. Wrap this area of the rope with tape. Cut through the tape and mark the tape with the initials of who cut it and the date.

- Tape Lifts – clear “book” tape and laser printer transparency sheets (found in any office supply store) may be used to collect Questioned fibers from areas such as clothing or vehicle upholstery. The tape roll must be stored in a closed clean container, such as a ziplock bag, to prevent extraneous fibers and debris from contaminating the edges of the tape. Remove a strip of clear tape from the roll and fold over each end to form “handles” for manipulating the tape during collection. Apply the adhesive side of the tape to the fabric. Lift the tape by the “handles” and re-apply several times. Stop when the tape begins to lose its tackiness, but still has enough clean adhesive to adhere to the clear transparency sheet. Apply the tape strip to the transparency sheet adhesive side down. Do not fold the tape lift onto itself (they are difficult to work with). Do not place the tape onto cardboard or paper (it greatly complicates the examination process). Label the transparency sheet with the location that you tape lifted. Place tape lifts from different locations on separate transparency sheets.

If the precise location or distribution of questioned fibers on an item is needed, an item may be “mapped” by taking a “one-to-one” tape lift. In this method each tape strip is applied to the surface one time only. The tape strips are then placed on the transparency sheet in the same arrangement as they were applied to the evidence surface. It is sometimes easier to keep

track of the placement if all of the tape strips are applied and then all of the tape strips are sequentially removed and placed on the transparency sheet(s).

The tape lift contains Questioned fibers. The remaining fabric, from which the tape lift was taken, is a possible Known fiber source and should also be collected.

- Sticky Notes – smaller areas with fewer Questioned fibers may be “tape lifted” using the adhesive area of sticky notes (Post-it™ notes). Apply the clean adhesive side of a sticky note to the surface to collect the loose fibers, or pick the fibers off the item using clean tweezers and place them on the sticky note adhesive. Marking the note paper with an arrow to the questioned fiber(s) is an option for more easily locating the fiber(s) in later examinations. Fold the note paper over to protect the adhesive surface from collecting any additional debris. Label the note paper with the location that was tape lifted. The sticky note contains Questioned fibers.
- Do NOT use a vacuum to collect fibers. Even vacuum assemblies designed for collection of trace materials often lose fibers due to the particle size limit on the filter. They also pick up more dirt and extraneous materials and cause static issues with the fibers that are collected.

Sources of Questioned Fibers

- Trunks of vehicles
- Knife blades/gun barrels/weapons
- Shoe outsoles (carpet transfers)
- Blankets
- Ropes/Bindings
- Upholstery (vehicle or residential)
- Exterior surfaces and undersides of vehicles in “hit-and-run” incidents
- Suspect hair (Ski mask transfers)
- Victim hair (transported in vehicle truck or wrapped in blanket that was subsequently removed)

Sources of Known Fibers

- Any article composed of fibers

Packaging

- Blankets – be sure the blanket is dry. Air dry following the same guidelines as clothing if needed. Place the dry blanket, along with any paper used in the drying process, in a paper bag. Be sure the bag is large enough that the blanket fills no more than 2/3 of the bag. Label and seal the bag.
- Carpeting – be sure the carpet samples are dry. Air dry following the same guidelines as clothing is needed.
- Clothing – Package the outermost layer separate from the inner layers. Package shoes separate from the rest of the clothing. Place the dry clothing, wrapped in the paper used in the drying process, in a paper bag. Do not fill the bag more than 2/3 full. Label and seal the bag. Include the name of the person from whom the clothing was collected. Do not label the item with only “suspect” or “victim”. Do not package victim and suspect clothing together. If articles of clothing were at any point packaged together, then they need to stay together. Don’t remove them and place in separate packages. This creates more problems than it

solves.

Fabric Impressions – photograph, collect, and package the Fabric Impression according the Impression subsection of this manual.

- Other Objects – be sure the object is dry. Air dry following the same guidelines as clothing if needed. Loosely fold paper around the dry object using either the paper that it was dried with or new paper. Place the paper wrapped object in either a paper bag or a box. Use a box if the object is heavy and/or has sharp edges (e.g. knives, tools, broken glass shards, etc.). Use either extra wadded paper or zip ties to secure the object from moving around excessively in the box or paper bag. Label the box or paper bag and seal.
- Rope/Bindings – Place the dry rope, wrapped in the paper used in the drying process, in a paper bag. Label and seal the bag.
- Sticky Notes – place sticky notes inside an anti-static zip-lock plastic bag or inside a small coin envelope and tape the envelope flap and any corners closed. Be sure to label the small coin envelope with the location of where the fibers were collected. If they came off a vehicle, include the license plate or VIN. Place the small coin envelope into a larger envelope or bag. Label and seal the larger envelope or bag.
- Tape Lifts – tape lifts should be on clear, laser printer transparency films. Be sure the films are labeled as to the location of where the tape lifts were taken. If from a vehicle, be sure to include the license plate or VIN . Place the films in a large paper envelope. Label and seal the large envelope.
- Upholstery (Fabric) – the Questioned and Known samples must be packaged separately. The Questioned sample consists of Tape Lifts, so follow the Tape Lifts packaging. Collect a Known sample AFTER the Questioned sample is collected. The Known sample consists of cut piece(s). These pieces should be dry and placed in either a paper bag or a paper envelope and sealed. Be sure to label the outer packaging with the information about where the sample was collected. If the sample was from a vehicle, include either the license plate or VIN. Also indicate from which seat the upholstery was taken (i.e. Driver, Front Passenger, Back Driver, Back Passenger, etc.).

FOOD, GASTRIC CONTENTS, AND VOMIT

Food traces are ubiquitous in dwellings and vehicles and can be found on clothing and bedding. These particles may be transferred to practically any surface. Common food traces include spices, herbs, salt, sugar, starches, cereal grain, pastry and bread crumbs, meat, vegetables, and fruits. Food particles are examined microscopically and identified to a food type (e.g. cereal grains, spice, meat). An examination of food particles may be used as associative evidence linking people, places and objects. Vomit samples submitted to the laboratory are of two types; gastric samples collected during autopsy or dried stains on materials such as clothing. An examination of gastric contents can assist in establishing time of death. Food particles in vomit stains can be compared to an individual's known gastric contents.

Precautions

Biological hazards exist when handling gastric contents which could be contaminated with infectious organisms.

Significance

The examination of food and vomit may reveal:

Classification/Identification of the Material

- Identification of the type of substance.

Comparative Associations

- Origin of the vomit (e.g. Asian restaurant vs. breakfast cereal).
- A possibility of common origin if the questioned food specimen and control samples show similarities. The rarity and diversity of the materials found would have probative significance.

Generation of Investigative Leads

- Establishing a time line. Food products are retained in the stomach for up to approximately 8 hours depending upon the type of food and biological/environmental conditions.

Collection

Methods

- Intact Object – Items such as a pair of shoes or a shirt containing stains may be collected in total.
- Scraping - If the item containing the vomit stain cannot be sent to the laboratory, scrape off the dried stain into a small paper fold or envelope. If the vomit is in a fluid state, place it in a plastic container and properly label.
- Forceps – This method would be used to collect dried stains into a sealed envelope.
- Spooning – This method would be used to collect liquid vomit. Use a clean spoon for each sample collected.
- Pipetting – This method would be used to collect liquid vomit without large chunks. Use a clean pipette for each sample collected.

Sources of Questioned Materials

- Clothing - recover the clothing to be examined, taking care to avoid contamination and loss of trace evidence. Do not attempt to collect the trace material. Collect the clothing from different individuals [suspect(s) and victim(s)] in different locations and by different evidence technicians whenever possible.. Collect the outermost layer separate from the inner layers. Collect shoes separate from the rest of the clothing. Air dry clothing items at room temperature in a protected area and place a clean piece of paper over the item to protect against contamination while drying. Do not use fans to dry the items. Dry suspect's clothing in a separate location from the victim's clothing. Place the dry clothing, along the paper used in the drying process, in a paper bag. Label and seal the bag.
- Gastric Contents - Gastric contents collected at autopsy need to be well secured in an air tight container. The vomit sample should be refrigerated prior to sending it to the laboratory.
- Dried Food Particles - Dried food particles can be picked up with a forceps or a sticky note.
- Liquids - Liquid foods and vomit can be spooned or pipetted.

Sources of Known Materials

- Dried Food Particles - Dried food particles can be picked up with a forceps or a sticky note.
- Liquids - Liquid foods and can be spooned or pipetted.
- Meat.

- Submit control samples from food ingredients or food products such as spices, cookies, and beef jerky.

Packaging

- Vomit stains on materials must be air dried prior to packaging and submission to the laboratory.
- Liquid specimens should be placed in plastic or glass containers with a screw top lid and should be refrigerated or frozen as soon as possible.
- Each of the recovered items must be packaged separately, properly labeled, and sealed. If a vehicle is involved, labeling should include the location on the vehicle, make, model, year, VIN, and license plate number.
- Containers must be sealed to ensure that no leakage occurs. Put dried material into a small folded paper packet, or paper container and label, and then place the packet into a second container, also labeled properly.
- Package so that if a container opens or tears during shipping, the material is not lost and does not leak out and contaminate other evidence or pose a safety hazard.

GLASS

Forensic glass examinations usually involve the comparison of a questioned glass sample with a known sample from a broken glass source. The analysis can reveal if two samples of glass have a possible common origin. If only questioned glass fragments are recovered, the end use, or type of glass, may be determined (e. g. tempered glass, bottle glass, laminated glass, etc.) to provide information to locate the source. The way the glass is broken and the position of the glass fragments may reveal the direction of a projectile and potentially the order in which several projectiles penetrated a glass pane or window.

Homicides, burglaries, hit-and-run cases, and assault cases may provide useful glass evidence. With larger pieces of glass, it may be possible to physically fit the questioned glass to larger pieces of the control sample of glass. These examinations require the complete collection of the control glass pieces.

Precautions

Broken glass can cut hands, bags, and other evidence. Be sure to take the proper precautions when handling glass evidence. Wear leather gloves underneath the disposable gloves when handling sharp glass fragments.

Significance

The examination of glass may reveal:

Classification/Identification of the Material

- Type of glass – tempered, laminated, bottle.

Comparative Associations

- A possible association between a questioned sample and a known source.

Physical Match

- Broken pieces of glass were at one time a single piece of glass.

Damage Analysis

- The direction of force that broke the glass.
- The direction of travel of a projectile that perforated the glass.

Collection

Methods

- Intact Object – objects with suspected glass fragments should be submitted intact. Do not try to recover the glass fragments if the object itself can be packaged.
- By Hand – Use leather gloves underneath disposable gloves to hand collect large pieces of glass with sharp edges.
- Scooping – Use a clean hand shovel and a clean piece of cardboard as a dust pan to collect tempered glass fragments from the ground. Clean hand shovel and use a new piece of cardboard between samples.
- Forceps – Use a clean pair of forceps to remove individual glass fragments from residential door frames or vehicle window frames. Dismantling the vehicle window frame may also assist in reaching some glass fragments.
- Sticky Notes – if the entire object cannot be submitted, small glass particles on small surface areas may be collected using the adhesive surface of a sticky notes.
- Tape Lifts – clear “book” tape may be used to collect glass particles off of larger surface areas such as vehicle upholstery. Remove a strip of clear tape from a dispenser and fold over the ends. Handle the tape from the folded over ends and apply the adhesive to the upholstery multiple times. Make sure you don’t overload the taping. The tape should have enough adhesive after touching it to the surface to still adhere to clear transparency film. All clear tape strips should be placed on clear transparency film (look for transparency film for laser printers at any office supply store). Do not fold the tape lift onto itself (they are difficult to work with). Do not place the tape onto cardboard or paper (it greatly complicates the examination process). Label the transparency film with the location that you tape lifted. Be sure to keep tape lifts from different locations on different transparency films.

Sources of Questioned Samples

- Clothing – Air dry clothing items at room temperature in a protected area and place a clean piece of paper over the item to protect against contamination while drying. Do not use fans to dry the items. Dry suspect’s clothing in a separate location from the victim’s clothing. Place the dry clothing, along the paper used in the drying process, in a paper bag. Be sure that victim and suspect clothing are separate. Collect shoes separate from the rest of the clothing.
- Ground / Floor – use scooping method. If soil is collected, be sure to allow the material to air dry at room temperature in a protected area and place a clean piece of paper over the item to protect against contamination while drying. Glass on the ground is considered a questioned sample, regardless of proximity to a broken object.
- Traffic Scenes - At traffic scenes, it is important to search a wide area. Glass fragments can travel appreciable distances in many directions; pieces of glass may drop off a fleeing auto some distance from the scene. All glass fragments must be recovered, with each different location identified and packaged separately, especially glass from headlights, tail lights, and signal indicators.

- Shoes – collect as an intact object separate from clothing. Glass fragments are often embedded in the soles and heels of shoes as one walks over broken glass. Do not remove the glass from the shoes. Wrap the shoes in clean paper and place them into separate, clean paper bags. Control samples collected at the scene should be submitted separately. Avoid contamination.
- Windows/Doors – the glass still in a window frame can be considered Questioned evidence in direction of force questions. Such glass is considered a known for comparisons.
 - Low Velocity Forces - If the direction of force which broke the pane of glass is to be determined, all of the glass must be retrieved. Low velocity forces include breakage by a person's hand, a baseball bat, a hammer, etc. Glass remaining in the window frame must be marked so the surfaces can be identified as "inside" or "outside," and may need to be taped to prevent loss or further breakage. The amount of glass on the ground or floor on each side of the frame should be noted and collected separately. Photographs of the window frame should be taken prior to collection of the complete frame.
 - Bullet Holes - If projectile holes, such as bullet holes, are to be examined, the entire pane of glass should be submitted intact. Care must be taken not to disturb any possible gunshot residue on the surface of the glass. The glass may have to be taped on the exit surface to hold it together. If the exit side cannot be determined, consult with the crime laboratory.

Sources of Known Samples

- Windows/Doors – the glass still in a window frame can be considered Known evidence for comparisons. Such glass is considered Questioned evidence in direction of force questions. When collecting as a known sample, collect pieces from different parts of the frame if possible. Many pieces are needed in order to document the variation of chemical features from that pane of glass. If multiple panes are present, collect separate samples from each broken pane. If the window/door is double paned, be sure to collect each of the broken panes separately and label which pane is "exterior" and which pane is "interior". Collect fragments from the frame using clean forceps. A general rule of thumb is collecting at least 10 pieces of tempered glass or enough flat glass pieces to cover a 2 inches square. More glass is always better. If not enough glass is possible, collect and submit what is present.
- Headlights – the glass still in a headlight rim frame can be considered Known evidence for comparisons. Remember vehicle filaments may also be analyzed for whether the lamp was on or off (see the subsection Vehicle Lamp Evidence).

Packaging

- Glass found in different areas must be packaged separately.
- Use metal cans, hard plastic containers, cardboard boxes, or pasteboard boxes to prevent loss the glass particles. Glass tears through both paper and plastic bags.
- Small pieces of glass should be placed in a paperfold, sealed, labeled, and packaged in a small rigid container (e.g., a pill box, metal vial). The container must also be sealed and properly labeled.
- Large pieces of glass should be packaged in rigid containers. Use packing material such as cardboard or part of a corrugated carton to avoid breakage and to protect the edges. Hand delivery is the preferred way to submit large pieces of glass, as it avoids the task of extensive packaging and reduces the risk of breakage.
- Package so that if a container opens or tears during shipping, the glass is not lost and does not leak out and contaminate other glass evidence or pose a safety hazard.

Submission

Evidence for requests of direction of force need to be hand delivered to the lab. Do NOT mail.

Write in the Special Instructions section of the RFLE what type of glass examination is desired (i.e. physical match, direction of force, comparison, classification of type of glass, etc.).

HAIR

Hair evidence may be found in all types of crimes, especially in crimes where bodily contact has been made, such as in crimes involving homicide, rape, and/or assault. Hairs may be examined for human or animal origin, if a hair may be suitable for nuclear or mitochondrial DNA analysis, if human what part of the body it may have come from, and any acquired characteristics such as burned, cut by glass, or natural color altered.

Microscopic hair comparisons are not performed in the crime laboratory.

Hairs suitable for DNA analysis are transferred to the DNA section for further analysis. Animal hair DNA analysis is not performed in the crime laboratory.

Precautions

Hairs may be used for DNA analysis. As such, they may be easily contaminated by handler DNA. Use DNA precautions when collecting hair evidence. Be sure to change your gloves frequently.

Significance

Microscopic examination and screening of hair can reveal:

Classification/Identification of the Material

- If the hairs are of human or non-human origin.
- If human, from what part of the body the hair may have originated.

Comparative Associations

- Hairs can be determined if suitable for nuclear and/or mitochondrial DNA analysis. Microscopic hair comparisons are not performed.

Damage Analysis

- If the hair has been subjected to trauma, such as high temperatures, flame, or a crushing blow.
- If the hair was broken by glass.

Generation of Investigative Leads

- If the hairs were forcibly removed from the body or were naturally shed.
- If the hairs have been cut.
- If the hairs have been chemically treated.
- If the hair indicates a hair-related disease.
- If the hair exhibits adhering trace evidence.

Collection

Methods

- Intact Object - whenever possible, the entire object with hairs should be submitted.
- Forceps – used for long hairs. Clean the forceps between different samples.
- Sticky Notes – if the entire object cannot be submitted, small amounts of hairs on small surface areas may be collected using the adhesive surface of a sticky notes.
- Tape Lifts – clear “book” tape may be used to collect hairs off of larger surface areas such as vehicle upholstery. If long hairs are visible, remove those hairs first with forceps. Then collect the remaining hairs with tape lifts. Remove a strip of clear tape from a dispenser and fold over the ends. Handle the tape from the folded over ends and apply the adhesive to the upholstery multiple times. Make sure you don’t overload the taping. The tape should have enough adhesive after touching it to the upholstery to still adhere to clear transparency film. All clear tape strips should be placed on clear transparency film (look for transparency film for laser printers at any office supply store). Do not fold the tape lift onto itself (they are difficult to work with). Do not place the tape onto cardboard or paper (it greatly complicates the examination process). Label the transparency film with the location that you tape lifted. Be sure to keep tape lifts from different locations on different transparency films.

Sources of Questioned Samples

- Blankets – recover the entire blanket to be examined, taking care to avoid contamination and loss of hairs and other trace evidence.
- Bodies - Check the hands of assault and homicide victims. Hairs may be found clutched in the hands or under the fingernails. Hairs may also be found on the bodies. Collect with forceps or sticky notes.
- Combing – collected as part of Sexual Assault Kits. Refer to the [Harborview](#) SEXUAL ASSAULT NURSES EXAMINATION (SANE) protocol for collection (Adult and Adolescent Sexual Assault Medical Evaluation) and packaging (Sexual Assault Evidence Packaging Handbook) guidelines.
- Clothing - recover the clothing to be examined, taking care to avoid contamination and loss of trace evidence. Do not attempt to collect the trace material. Collect the clothing from different individuals [suspect(s) and victim(s)] in different locations and by different evidence technicians whenever possible. Collect the outermost layer separate from the inner layers. Collect shoes separate from the rest of the clothing. Air dry clothing items at room temperature in a protected area and place a clean piece of paper over the item to protect against contamination while drying. Do not use fans to dry the items. Dry suspect’s clothing in a separate location from the victim’s clothing. Place the dry clothing, along the paper used in the drying process, in a paper bag. Be sure the victim’s clothing is packaged separately from the suspect’s clothing. Label and seal the bag.
- Embedded in Object - If hair is firmly attached or embedded in an object, do not remove the hair. Send the object with the adhering hair to the crime laboratory, if feasible. Otherwise, photograph the hair in place and then remove the hair carefully, keeping it intact. Contact the crime laboratory if there is any question on how to proceed.
- Long Hairs – collect with forceps. Immediately place in an envelope or bag.
- Loose Tufts – collect with a sticky note. Fold the note over immediately after collection to prevent air borne particles contaminating the stick note. Be sure to label the sticky note with the location from where the loose tuft was collected.

- Other Objects - small hairs should be left on the item whenever possible. The entire item, or at least the part holding the hairs, should be collected and submitted to the crime laboratory.
- Upholstery (Fabric) – use forceps to collect long hairs. Then use tape lifts to remove loose small hairs from fabric upholstery. If the upholstery is from a vehicle, be sure to label the transparency film with the tapings as to which seat it was taken from (Driver, Front Passenger, Back Driver, Back Passenger).

Sources of Known Samples

- Pulled Hairs – Pulled hairs are not required for analysis because microscopic hair comparisons are not performed. However, if a large number of hairs are recovered from an object, a pulled hair sample (pubic and/or head) may assist in screening the hairs for the best ones to send to DNA analysis. Refer to the [Harborview](#) SEXUAL ASSAULT NURSES EXAMINATION (SANE) protocol for collection (Adult and Adolescent Sexual Assault Medical Evaluation) and packaging (Sexual Assault Evidence Packaging Handbook) guidelines.

Packaging

- Do not combine hairs that are collected from different locations. Place the hairs from each location in separate paper containers or plastic bags. Place these small containers into larger manila envelopes, properly seal and label, and submit to the crime laboratory.
- Place the hairs in clean paper or small plastic bags (see page 18 for paperfolds). Seal with tape and write the date, time, item number, description of the evidence, and the location where it was found. Then place the sealed paper package into an envelope. Seal the envelope and identify the contents; note the date, time, and initials of the person handling the evidence.
- If the hairs are placed directly into an envelope, make sure that all the flaps and corners of the envelope are sealed with tape. Even a slight gap can cause hairs to be lost.
- Blankets – be sure the blanket is dry. Air dry following the same guidelines as clothing if needed. Place the dry blanket, along with any paper used in the drying process, in a paper bag. Be sure the bag is large enough that the blanket fills no more than 2/3 of the bag. Label and seal the bag.
- Clothing – Air dry clothing items at room temperature in a protected area and place a clean piece of paper over the item to protect against contamination while drying. Do not use fans to dry the items. Dry suspect's clothing in a separate location from the victim's clothing. Place the dry clothing, along the paper used in the drying process, in a paper bag. Be sure the victim's clothing is packaged separately from the suspect's clothing. Label and seal the bag.
- Sticky Notes – place sticky notes inside an anti-static zip-lock plastic bag or a small coin envelope and tape the envelope flap and any corners closed. Be sure to label the small coin envelope with the location of where the fibers were collected. If they came off a vehicle, include the license plate or VIN. Place the small coin enveloped into a larger envelope or bag. Label and seal the larger envelope or bag.
- Tape Lifts – tape lifts should be on clear, laser printer transparency films. Be sure the films are labeled as to the location of where the tape lifts were taken. If from a vehicle, be sure to include the license plate or VIN. Place the films in a large paper envelope. Label and seal the large envelope.

Submission

- Write in the Special Instructions section of the RFLE what type of hair exam is desired – suitability for DNA analysis, body origin of hair, type of hair damage, etc.

MISCELLANEOUS MATERIALS

An abundance of materials and particles that do not neatly fall into the above categories are submitted to the Materials Analysis Unit of the crime laboratory for analysis. Miscellaneous materials have included cigarettes, glitter, plastics, caulks, rubber bands, owl pellets, bird nests, paper match books, paperclips, filler ingredients in drugs, glassy material from burnt grass, soot, dust, debris from fingernails, etc. Each crime scene offers the investigating officer an opportunity to critically observe the surrounding area and determine which materials may have evidentiary significance. Please call the Materials Analysis Unit if you have any questions regarding what to collect.

Precautions

The investigator must use caution to avoid damaging exchange/contamination of evidence at the crime scene. Some exchange is unavoidable; however, it must be controlled and held to a minimum. After the incident, the suspect and the victim must not come in contact; clothing from each must be packaged and kept separate. The suspect and/or the victim must not be brought back to the crime scene while it is still being processed. Samples taken from the scene should be packaged separately from the suspect and victim clothing to avoid contamination. Special care must be taken not to contaminate or lose any small particles of evidence.

Avoid damaging any critical areas of the evidence which may have holes, rips, tears, smears, impressions, stains, cuts, or bloodstain patterns. When removing clothing, avoid cutting through these critical areas. If cutting is unavoidable, such as when removing clothing in an emergency room, be sure to take careful notes/photos of the location and appearance of the critical area, and identify the cuts made by medical personnel. Photographs taken before alteration or changes in appearance to the evidence item should be submitted with the items. Remember to use a scale/ruler in the photographs.

Control/reference samples must be collected as soon as possible to avoid loss and change. If control samples from both the victim and suspect are not both available, contact the crime laboratory to determine what evidence should be submitted. Both control and questioned samples usually must be submitted before any comparisons can be made.

Damp or wet items, particularly clothing, must be air-dried at room temperature in a secure area over clean paper. An exception to this would be evidence submitted for ignitable liquid analysis (Fire Debris); this evidence should be packaged according to guides on [page 45](#) of this manual. After drying, handle the clothing carefully so that trace evidence is not lost. Wrap the clothing items in clean paper and fold the air-dry collection paper to retain any loose debris. Place the collection paper and wrapped clothing into paper bags for submission to the crime lab. Wrapping the item in paper and folding the air dry collection paper keeps the trace evidence from being lost in the seams of the paper bag. Do not use plastic containers. Avoid contamination.

It is critical that each item or container be properly sealed and labeled. The label must describe the contents, the item number, the donor or source if known (do not identify the item as from the "victim" or "suspect" - please provide a name), location where found, date, time, and name of person collecting the evidence. The investigator should make notes as to the condition of the evidence and any other observations of value.

- Do not submit razor or scalpel blades or other sharps without crime lab management approval.
- Do not submit hypodermic needles or syringes with the needles attached without management

approval. The crime laboratory will not accept cases which contain needles, regardless of the packaging without prior approval.

NOTE: State regulations prohibit the removal of contaminated needles by shearing or breaking [WAC 296-823-14010 and WAC 296-823-18030].

Proper packaging is particularly important when handling fragile evidence such as paint flakes, glass fragments, head lamps, dental stone casts etc., as described in the following sections.

At the present time routine gunshot residue analysis (GSR) involving discharged primer particles is not examined in the WSP crime laboratory.

Significance

The examination of miscellaneous materials may reveal:

Classification/Identification of the Material

- What kind of plastic an object is made from.

Comparative Associations

- If a questioned material could have come from a specific source.

Physical Match

- If fragments were part of a single object at one time.

Damage Analysis

- If an object was damaged by a specific instrument. For example, if a window screen could have been cut with a specific knife.

Generation of Investigative Leads

- Possible manufacturing information.

Collection

- Forceps – Clean the forceps between different samples.
- Intact Object - If possible the entire object should be sent in. Large objects are accepted.
- Scalpel Scraping – use for sticky materials
- Sticky Notes – if the entire object cannot be submitted, small amounts of particles may be collected using the adhesive surface of a sticky note.
- Swabbing – use as a last resort. Often the cotton swab interferes with recovery of the particles. If used, also prepare a scalpel scraping.
- Tape Lifts – clear “book” tape may be used to collect materials off of larger surface areas such as vehicle upholstery. Remove a strip of clear tape from a dispenser and fold over the ends. Handle the tape from the folded over ends and apply the adhesive to the surface of interest multiple times. Make sure you don’t overload the taping. The tape should have enough adhesive after touching it to the surface of interest to still adhere to clear transparency film. All clear tape strips should be placed on clear transparency film (look for transparency film for laser printers at any office supply store). Do not fold the tape lift onto itself (they are difficult to work with). Do not place the tape onto cardboard or paper (it greatly complicates

the examination process). Label the transparency film with the location that you tape lifted. Be sure to keep tape lifts from different locations on different transparency films.

Packaging

- Materials found in different areas must be packaged separately.
- Each of the recovered items must be packaged separately, properly labeled, and sealed. If a vehicle is involved, labeling should include the location on the vehicle, make, model, year, VIN, and license plate number. Containers must be sealed to ensure that no leakage occurs. Put the material into a folded paper packet, or paper container and label, and then place the packet into a second container, also labeled properly.
- Package so that if a container opens or tears during shipping, the material is not lost and does not leak out and contaminate other evidence or pose a safety hazard.

Submission

Write in the Special Instructions section of the RFLE what kind of information you are looking for by this examination (manufacturing information, a comparison of two items of evidence, an assessment of the damage, etc.).

PAINT AND OTHER PROTECTIVE COATINGS

Chips and fragments of protective coatings-such as paint, varnish, lacquer, enamels, and plastics may be found at the scenes of hit-and-run cases and burglaries involving forced entries. A transfer of paint can occur when two vehicles collide. Chips of paint at the accident scene or on the victim's clothing may produce information regarding the year, make, and model of the vehicle which fled the scene. Traces of paint on burglary tools may connect these tools to the burglary scene.

Precautions

Be cautious when using a scalpel or razor blade to collect paint samples as they can break and/or cut.

Significance

The examination and comparison of paint or other protective coating chips and fragments may reveal:

Classification/Identification of the Material

- The type of paint or coating and its applications. This information may lead to a possible source.

Comparative Associations

- A possibility of common origin if the questioned chips and control samples show similarities in physical and chemical characteristics. Multilayered chips which also show similarities and correspondence in the number of layers, order of colors, and thickness of the layers can increase the probability of a common origin to a very high degree.

Physical Match

- That the paint chip from the scene came from a particular object or vehicle by a physical match (i.e., the questioned paint chip edges fit like a piece of a jigsaw puzzle with edges of the damaged area).

Generation of Investigative Leads

- Chips left by a vehicle at a hit-and-run scene may produce information regarding the make, model, and year of manufacture.

Collection

Methods

- Intact Object - If possible the entire object should be sent in. Large objects are accepted – including vehicle hoods and bumpers, residential doors and door frames, etc. Do not attempt to remove the paint if submitting the intact object.
- Scalpel Scraping
 - If an item is too large to submit to the laboratory, control paint chips or the questioned paint chips representing all of the layers must be submitted. Do not scrape off the sample in such a manner that the paint chip sample contains only a partial number of layers. The forensic scientist will examine a cross-section of the chip to determine the number, depth, and the color of each layer.
 - A convenient method of collecting paint scrapings is to tape an envelope or clean sheet of paper just below the sampling area. Hold the envelope or paper open and scrape the paint samples loose, allowing them to fall into the paper. Be sure the paint samples contain all the layers of paint down to the underlying surface. Use a new, clean blade for sampling each particular area. Tape the corners and seams of the envelope or use folded paper.
 - Use a clean scalpel or razor blade for each separate sample. This includes using different blades for the known and questioned samples taken from the same part of the vehicle.
- Forceps – used for chips and flakes. Small samples of material should be collected on a clean piece of paper. The paper fold is then labeled, sealed, and placed in an envelope, which in turn is labeled and sealed. Clean the forceps between different samples.

Sources of Questioned Materials

- Vehicle Hoods: – both Questioned sample and Known sample
- Vehicle Doors/Side Panels– both Questioned sample and Known sample
- Vehicle Bumpers– both Questioned sample and Known sample
- Tools – both Questioned sample and Known sample
- Other Objects– both Questioned sample and Known sample
- Wall Board– both Questioned sample and Known sample
- Doors and Trim Boards– both Questioned sample and Known sample
- Clothing - recover the clothing to be examined, taking care to avoid contamination and loss of trace evidence. Do not attempt to collect the trace material. Collect the clothing from different individuals [suspect(s) and victim(s)] in different locations and by different evidence technicians whenever possible. Collect the outermost layer separate from the inner layers.

Collect shoes separate from the rest of the clothing. Air dry clothing items at room temperature in a protected area and place a clean piece of paper over the item to protect against contamination while drying. Do not use fans to dry the items. Dry suspect's clothing in a separate location from the victim's clothing. Place the dry clothing, along the paper used in the drying process, in a paper bag. Be sure the victim's clothing is packaged separately from the suspect's clothing. Label and seal the bag.

Sources of Known Materials

- In all cases, the control samples must be taken from an undamaged area immediately adjacent to the area of damage or of interest. The collected chips must contain all of the layers down to the underlying surface. If a physical match is possible, all paint from the damaged area must be collected or the item submitted.
- When investigating a hit-and-run collision, control samples should be taken from each vehicle. The samples should be taken from the undamaged area on the same panel immediately adjacent to the damage. Similar control samples must be taken from the suspect vehicle when it is apprehended. Different body panels or parts may have different paint or layer structure. Samples from each damaged panel must be taken (i.e., fender and door).
- At burglary scenes, control samples should be taken from an area immediately adjacent to the tool mark. Do not touch the tool mark itself; it may be altered and rendered useless for later tool mark comparison examinations. The paint on a door or window jamb may not be the same as on the door or window itself. If it appears that paint may have transferred from both surfaces, control samples must be taken from each surface.
- Vehicle Hoods: – both Questioned sample and Known sample
- Vehicle Doors/Side Panels– both Questioned sample and Known sample
- Vehicle Bumpers– both Questioned sample and Known sample
- Tools – both Questioned sample and Known sample
- Other Objects– both Questioned sample and Known sample
- Wall Board– both Questioned sample and Known sample
- Doors and Trim Boards– both Questioned sample and Known sample

Packaging

- Paper-folds and plastic or paper envelopes can be used to collect the paint samples. Paper is preferred over plastic because of the static electricity buildup problems of plastic.
- Each of the recovered items must be packaged separately, properly labeled, and sealed.
- If a vehicle is involved, labeling should include the make, model, year, VIN, and license plate number. Also indicate from what part of the vehicle the sample was taken (i.e. damaged area from front quarter panel, undamaged region near damaged area of front bumper, etc.).
- Indicate from where a sample was taken (i.e. ground near victim, exterior side of front door, damaged region of East wall of living room, etc.).
- Envelopes must be sealed on the corners with tape to ensure that no leakage occurs. Put the paint chips into a folded paper packet and label, and then place the packet into a second envelope, also labeled properly.
- Tools - Tools with paint smears must be protected to avoid loss or contamination of the questioned paint. The area containing the paint smear should be protected with soft tissue paper, and the tool packaged securely into an appropriate container (e.g., box).
- If paint chips are to be submitted for a possible physical match, they must be packaged so that the chips do not break. The chips must be protected with tissue paper or cotton and placed in a small, rigid container.

Submission

If submitting paint for comparisons, be sure to identify on the RFLE which items are the questioned samples and which samples are the known. Indicate in the Special Instructions section what comparisons should be performed.

If submitting paint for an investigative lead, please indicate on the RFLE that a make/model search is desired and from which items.

SOIL AND GEOLOGICAL MATERIALS

Soil consists of loose aggregates of rock, mineral, man-made materials, botanical and biological material. Due to its widespread occurrence and tendency to adhere to most materials, soil is commonly present on or in physical evidence. Examinations are performed to characterize, identify and compare soil evidence, which may help to establish an association between individuals, objects and/or locations. Soil is a non-manufactured product with great compositional variation which can lead to very strong associations. A detailed examination of soil recovered from bodies, clothing, vehicles, etc. may be used as an investigative tool in identifying a soil's geographic source.

Significance

The examination and comparison of soil or other geological materials may reveal:

Classification/Identification of the Material

- Identification of the type of substance (e.g. rock, mineral, sand/silt/clay, peat, asbestos).

Comparative Associations

- A possibility of common origin if the questioned soil and control soil samples show similarities in physical and chemical characteristics.

Physical Match

- Rock found in different locations can be physically fit together (e.g. A broken rock found embedded in a victim's head was physically matched to a rock found in the suspect's pickup truck).

Generation of Investigative Leads –Geo-sourcing

- Determination of a possible source of the questioned soil by an analysis of physical and chemical properties (e.g. soil found on a shovel can be examined to determine possible locations of the soil).
- Substitution cases (e.g. when farm equipment is delivered to a final destination, upon opening the container, rocks are found instead of farm equipment. The source of the rocks may determine where the switch was made).
- Rocks may contain traces of hazardous elements and minerals (e.g. a child with high levels of arsenic in her blood was related to her licking on arsenopyrite rock found in a caregivers apartment).

Collection

Methods

Note soil collection locations with Global Positioning Satellite (GPS) technology, if available.

- **Surface samples:** These can be collected from either the top soil horizon (layer) of a soil or from the depth of any existing impressions (such as tire tracks or footwear impressions).
 - Collect 45 – 60 grams [2 – 3 tablespoons] per sample to a depth of approximately 1 – 2 cm [1/2 to ¾ inch] or to the depth of any existing impressions of interest. Coarse-grained materials, such as gravel or pebbles, require a significantly larger sample volume/size. If objects or features larger than approximately 2 mm (or about 1/8 inch) are present, collect a volume of soil that is at least 10 times larger than the largest grain or feature.
 - Collect separate samples from areas which are visually distinct (e.g. different in color or texture). Note that such differences may occur even within a single impression.
 - If distinct impressions are present, samples should be collected from an area as close as possible to the impression. Once impressions have been documented/photographed/cast, samples may also be collected from within the area of the impression (sidewalls and floor). If necessary, to avoid any remaining plaster, collections may be made from the areas adjacent to the impression as well.
 - When no distinct impressions are present, a combination of purposeful and systematic sampling techniques appropriate to the location is recommended.
 - PURPOSEFUL: This approach is useful when specific areas of interest have been identified. Such specific areas of interest may include areas of entry, areas of egress, burial sites, areas of disturbance, footwear or tire impressions, areas with visual (texture or color) similarities to questioned samples, or areas with appearances anomalous to the surrounding materials.
 - SYSTEMATIC: This approach is a pattern-based technique for the collection of samples. A variety of patterns may be used, to include grids, circular patterns, compass points, etc. This technique may be of value when there are no obvious features from which to sample (e.g. looking for a burial site or buried object) or for sampling around a single object of interest (such as a body) when no other features (such as shoeprints or tire impressions) are present (e.g. If suspects claim that the soil on their shoes came from somewhere in their backyard, and the yard is a featureless lawn, a systematic sampling approach may be warranted).
- **Sub-surface collections:** Soils vary with depth. Variations may be visual (color, structure, and texture) or composition-based (chemical, mineralogical, physical, biological content, etc.). Therefore, in locations where soil has been removed from areas below the surface, including, but not limited to, burial sites, holes, river banks, cut banks, or deep tracks or ruts, collections should be made to encompass any variability present with increasing depth.
- Attention must be paid to the appearance of the side walls of any excavation, as toolmarks or other impressions may be present. These should be documented appropriately and preserved prior to any soil collection. Such marks may also be excised and collected intact for further analysis.
- Samples from each visually distinct area should be collected separately. Such areas may encompass distinct layers, horizons, or distinguishable soil aggregates. Additionally, if disturbed or displaced soil is present, samples distinguishable from each other may be collected from these sources.
- When no visually distinct layers are present, a systematic sampling technique is recommended to make collections throughout the depth of the hole. Samples should be collected at regular intervals of approximately 15 – 30 cm [6 to 12 inches] to the greatest depth from which soil may have been transferred. Coarse-grained materials, such as gravel or pebbles, require a significantly larger sample volume/size. When coarse-grained materials or features are present, the volume of

soil collected should be at least 10 times larger than the largest pebble or gravel object or feature of interest.

- Background samples may be collected from an undisturbed area adjacent to the burial site at similar depth intervals to the same depth as the excavation.
- To obtain a representative sample from the depth profile, collect small samples from each layer or horizon and package them separately.
- If the soil horizon in the depression has been compromised, mixed, or cannot be observed, a depth profile may be observed by excavating a soil pit in close proximity to the original site and collecting representative samples of the profile.
- A representative sample should also be collected from the base of any depression or excavation. For example, when a body is present, a sample should also be collected from the undisturbed soil at the same depth as the body but adjacent to it.
- Collections from objects: Soil and other geological materials may be retained on the surfaces and in crevices present on a variety of objects that cannot be delivered to the laboratory. Special care should be taken to preserve any depositional (structure or layer) information present.
- Collection(s) of consolidated soil: Soil may contain useful structure and layering information which should be maintained. These samples can be very fragile and should be collected very carefully in order to preserve this information.
- Collection(s) of unconsolidated thin deposits or dust: Where possible, the entire item (tool, car floor mat, etc.) bearing the deposit should be submitted to the laboratory. Where this is not possible, the deposits should be collected as discussed below.
- Methods commonly used to collect thin deposits include scraping, sweeping, brushing and swabbing.
- Swabs which have been moistened should be allowed to dry prior to packaging or packaged so as to enable the drying of the sample without the loss of any recovered evidence.

Sources of Questioned Samples

- Clothing – Examine clothing or other materials for stains, smears or clumps of soil. Soil may fall from clothing as it dries; therefore collect clothing as soon as possible. Do not remove soil from clothing; preserve it with the evidence item.
- Vehicles– Examine the entire vehicle for soil including undercarriage, wheel wells, tire sidewalls, floorboards, trunk and any areas that an individual could come in contact with the vehicle. Examine the undercarriage of vehicles for areas of missing soil. The shape of such gaps can be compared to soil found at the scene for a physical match. Clumps of soil with distinctive layers may be found in or on vehicles and at the scene of hit and run or other accidents. Collect soil clumps in separate small cushioned containers to prevent breakage. Do not vacuum samples; this will result in a mixing of different soils.
- Tools – Tools and weapons may have lodged soil particles. Do not attempt to remove the soil, submit the entire tool.

Sources of Known Samples

- Graves (collect approximately eight surface soil samples from around a grave at distances of 50 and 100 yards in four convenient directions at right angles to one another. Remember to label the locations and distances of each sample (see sub-surface sampling above).
- Victim and suspect environments such as a backyard or workplace.
- Alibi soil samples (e.g. the suspect states the soil on his boots originated from the landfill).
- Along roadways, fields, marshes, campgrounds (see surface sample collection above).
- Shoe and tire impressions (see surface sample collection above).

Packaging

- Each of the recovered items must be packaged separately, properly labeled, and sealed. If a vehicle is involved, labeling should include the location on the vehicle, make, model, year, VIN, and license plate number. Containers must be sealed to ensure that no leakage occurs. Put the soil into screw top plastic containers.
- If the soil is moist or wet upon collection, air dry completely and then package.
- Do not package soil evidence in paper envelopes soil and sand easily leaks through the seams.
- Tools with soil must be protected to avoid loss or contamination of the questioned soil. The area containing the soil should be photographed showing the location of the soil, then protected with soft tissue paper, and the tool packaged securely into an appropriate container (e.g., box).
- Soil clumps can be gently wrapped in tissue paper and placed into small cardboard boxes of a size that the lump will not freely move within the box.

TAPE

Tape consists of at least a flexible backing and an adhesive. A variety of tapes is commercially available, such as duct, vinyl electrical, packaging, and masking tape. Overall construction and chemical components will vary between product types and within a single tape type.

Tapes may be found at a variety of crime scenes, such as wrapped around improvised explosive devices (IEDs), used to bind victims, or on threatening letters or envelopes. Based on the types of cases in which they are involved, tape pieces and tape rolls are generally easy to find. The examination of tape can provide investigative leads, corroborate statements or events, and associate scenes or a person to a scene.

Precautions

A chemical in many report covers and other flexible plastic sheets can interfere with the analysis of tape adhesives. Therefore, ONLY use laser printer transparency film or fire-debris plastic bags when packaging strips of Questioned tape.

May provide evidence types including latent prints, DNA, hairs/fibers, explosive residue, miscellaneous trace evidence. Please consult the laboratory to determine the highest priority before examination.

Significance

The examination and comparison of tapes and adhesives may reveal:

Classification/Identification of the Material

- Type of adhesive (electrical tape, duct tape, rubber cement, etc.)
- Scrim (fiber) count may indicate household versus commercial use duct tape.

Comparative Associations

- A possibility of common origin between a questioned sample and roll of tape.

Physical Match

- The tape itself can be examined for a physical match with known tapes.

Collection

Methods

- When possible, submit tape still adhering to the substrate to minimize loss of trace evidence, latent fingerprints, or contact impressions.
- If unable to submit substrate, do not distort or tear the tape during removal.
- If the tape is cut during removal, mark cut ends accordingly.

Sources of Questioned Samples

- Pieces
- Bindings
- Wrappings

Sources of Known Samples

- Rolls

Packaging

- Pieces – individual pieces should be placed on clear transparency film (look for transparency film for laser printers at any office supply store). An alternative is the fire debris plastic bags.
 - Do NOT place pieces of tape on paper because the paper is hard to remove from the adhesive.
 - Do NOT place pieces of tape on plastic document protectors because they contain chemicals that interfere with analysis of the adhesives.
 - Do NOT fold the tape onto itself.
- Rolls - Tape rolls can be placed in a cardboard box or paper bag.
- Wrappings or Bindings – place in a plastic fire debris bag. Do NOT wash if at all possible.

VEHICLE LAMP EVIDENCE

Vehicle lamps are submitted when the question of whether a vehicle's lamps were on (incandescent) or off at the time of an impact may be critical to the investigation of a case. Examinations are conducted by obtaining lamp(s) from the area of impact on the vehicle and examining the filaments and other portions of the lamp affected by the filaments. Exams of other lamps at a distance from impacts can only yield information as to whether the lamp is functional based on continuity of the filaments. These types of exams should be limited to lamps from motor vehicles (i.e. cars, trucks, motorcycles), since the empirical data upon which these lamp exams are based come from motor vehicles. If lamps from other types of vehicles are examined, caution must be used in interpreting motor vehicle data.

Precautions

- Never turn on a vehicle's headlamps after an accident. If the glass envelope of a bulb has fractured, the filament can burn out when energized and show indications of being incandescent at impact.
- The evidentiary value of vehicle lamps can be lost if the lamps are not collected, packaged, and transported using the correct procedures. Lamp filaments are often fragile after an impact. Lamps should always be hand carried to the crime laboratory rather than mailed or shipped.

Significance

Vehicle lamp conclusions range from "on" (incandescent) at the time of impact to "off" at the time of the impact in question. The condition of vehicle lamps after an impact can often be explained by more than one set of circumstances. For this reason, vehicle lamp cases are often inconclusive.

Collection and Preservation

- Photograph the lamps in place prior to removal. Record the dash lamp switch position and if the vehicle is equipped with daylight running lamps.
- Prior to removing a lamp, mark the 12 o'clock or "up" position.
- If possible, measure continuity of the filaments using a circuit tester prior to collecting the lamps. Do not test continuity by turning on the lamps.
- Avoid breaking any filaments during handling or transporting lamps. If a filament is accidentally broken, make note of the fact and submit the information with the lamp.
- Whenever possible, submit all of the lamps from the vehicle in question.
- If a lamp is intact and easily removed from its socket, it can be removed as normal for replacing the lamp.
- Broken lamps should be removed with the lamp base and packaged to protect the filaments. One method of accomplishing this is to push the lamp base through a hole in the bottom of a drink cup, cut the bottom from a second cup to put over the lamp as a spacer, and use a third cup as a cover. Tape the cups together.
- Check the lamp housings and surrounding areas for loose filament fragments. Use tweezers or "Post-it" notes to collect any fragments of loose filaments present. These can then be packaged in plastic bags or envelopes.
- Do not place packaging materials around the filaments of broken lamps.
- Provide a diagram of the accident, speeds and directions involved, vehicle information, and photographs of the damage. Include any additional relevant information, such as number of impacts, any prior impacts the lamps may have been subjected to, time of day, and weather conditions.
- When the lamp is removed from the vehicle, label with the exact location, usage, and vehicle information (year, make, model, license number, and VIN).

Packaging

- Verify that the lamp is labeled with the exact location, usage, and vehicle information (year, make, model, license number, and VIN).
- Ensure that the lamps are protected from shock and that all packaging materials are well sealed.

Submission

- Hand carry to deliver all vehicle lamps. Failure to hand carry vehicle lamps can result in a loss of information. There are circumstances when the damage to a lamp can be used to determine if it was incandescent at the time of an impact only if it can be demonstrated that the damage did not occur subsequent to the impact.

WOOD AND OTHER BOTANICALS

Botanical examination typically involves small, often incomplete fragments of leaves, woody and non-woody fibers, needles, grass, stems, thorns, weeds, flowers, tobacco, seeds, diatoms, pollen and spores which are found as associative evidence on or in clothing, vehicles and soil.

Precautions

Species identification is seldom performed with the exception of some woody material including lumber and pulpwood.

Significance

The examination and comparison of botanicals may reveal:

Classification/Identification of the Material

- Identification of the type of substance
- Origin of the material (e.g. hardwood forest vs. mangrove swamp)

Comparative Associations

- A possibility of common origin if the questioned botanical specimen and control samples show similarities. The rarity and diversity of the materials found would have probative significance.

Physical Match

- Two broken pieces were at one time a single object.

Generation of Investigative Leads

- Possible age of material (e.g. tree rings)

Collection

- Loose - If possible the entire object should be sent in.
- Clothing - If botanicals are suspected to be on clothing, do not attempt to remove them at the scene. Handle the clothing carefully so that the fragments are not lost or transferred to other items. Wrap each article of clothing in clean paper and package them in separate paper bags. Do not vacuum botanicals, many are very brittle.
- Vehicle (Interior)
- Vehicle (Exterior) – large pieces of plant material caught under vehicles should be carefully removed and packaged into cardboard boxes to prevent damage.
- Shoes – Botanicals are often embedded in the soles and heels of shoes as one walks. Do not remove the particles from the shoes. Wrap the shoes in clean paper and place them into separate, clean paper bags.
- Control samples collected at the scene should be submitted separately. Avoid contamination.
- Pathways - Submit control samples from botanical sources observed along suspected paths leading to and from the crime scene, below windows at burglary scenes and at any area the suspect may have traveled through. Sample whole specimens if possible including the roots, leaves, seeds, etc. You may decide to cut off small branches having specific vegetation. To collect easily transferred vegetation along a path, obtain a clean piece of white fabric about one foot square and drag it through the pathway above the ground. Small thorns, seeds, etc. will stick to it. Package the fabric in a paper envelope.
- Living Specimens – Living specimens (e.g. leaves) that are collected need to be either submitted as soon as possible to the crime lab, or placed on clean paper between the pages of a heavy book to dry prior to submission to the lab. Please contact the lab if you have any questions.

Packaging

- Materials found in different areas must be packaged separately.
- Vegetative materials rot easily. Be sure your samples are dry.

- Each of the recovered items must be packaged separately, properly labeled, and sealed. If a vehicle is involved, labeling should include the location on the vehicle, make, model, year, VIN, and license plate number. Containers must be sealed to ensure that no leakage occurs. Put the material into a folded paper packet, or paper container and label, and then place the packet into a second container, also labeled properly. Do not place moist botanicals in plastic or glass containers. If the material is moist or wet upon collection, air dry completely and then package.
- Tools containing botanicals must be protected to avoid loss or contamination. The area containing the material should be protected with soft tissue paper, and the tool packaged securely into an appropriate container (e.g., box).
- Package so that if a container opens or tears during shipping, the material is not lost and does not leak out and contaminate other evidence or pose a safety hazard.

FIREARMS EVIDENCE

INTRODUCTION

The number of incidents involving firearms evidence has increased significantly in recent years. The requests for examinations involving firearms, ammunition, and components of cartridges have grown immensely. It is important that the evidence be properly collected and handled in order to expedite and maximize the examination results.

PRECAUTIONS

- Do not pick up the firearm by placing a pencil or some other object in the barrel. Pick up by checkered portion of the grip. Always handle the evidence with gloves.
- Handle the firearm carefully, even if the safety is on or the firearm is not cocked. The safety may be faulty or the trigger pull may be very light ("hair trigger"). Place the firearm into a box (preferred), paper bag, or envelope for transport back to the workstation.
- Knives/Firearms/sharp items: should be placed in a new cardboard box and secured with plastic zip-ties.
- If the firearm is loaded, it must be unloaded before shipping to the crime laboratory. If, for some reason, the firearm cannot be unloaded, the submitting agency must call the crime laboratory and determine when and how to hand deliver the firearm to the laboratory.
- If the firearm is to be processed for latent fingerprints or DNA, caution should be exercised in order to prevent the destruction of prints or the contamination of potential DNA on the firearm. The submitting agency should call the crime laboratory for instructions prior to packaging and submitted evidence to the laboratory if there are questions regarding latent fingerprints or DNA.
- If a firearm or other metal object is recovered from fresh or salt water, it should be placed in a container of fresh water immediately. Immersion in fresh water will slow the oxidation process and remove the corrosive action of the salt water.
- Do not clean the firearm before submitting.
- Do not fire the firearm before submitting.

Proper labeling of evidence includes the contents, source, date, time, item number (alpha-numeric as necessary), agency name and case number, and the name or initials of the collector.

- Secure weapons in new cardboard boxes with zip-ties or other method to prevent movement.
- Document and label the package appropriately (see [pages 15-17](#) of this manual).

SIGNIFICANCE

The laboratory examination may reveal data about the firearm, ammunition, or components, information regarding the target object, and may contribute information regarding the circumstances of the firearm incident. The examination may determine:

- The caliber of the fired ammunition.
- The type of firearm by examining the recovered bullets and expended cartridge cases.
- If the recovered bullets and expended cartridges cases were fired from a particular firearm.
- Any malfunctioning of a submitted firearm.

- The entrance and exit bullet holes in clothing.
- The approximate distance from muzzle to target.
- Any obliterated serial numbers.
- Bullet trajectories.
- Reconstruction of events.

METHODS USED

- Detailed examination of firearms including test firing and collection of fired bullets and cartridge cases.
- Microscopic comparisons between test fired bullets and cartridge cases, to each other, and then with submitted fired bullet and cartridge case evidence for specific firearm association.
- Microscopic examination of fired bullets for caliber determination, number of firearms used and the generation of a list of possible responsible firearms.
- Microscopic examination of fired cartridge cases to determine the number of firearms used.
- Polishing, acid etching and other methods applied to items with obliterated identifying markings or serial numbers.
- Visual and microscopic examination and chemical processing of items for the presence of gunshot residues, normally lead and gunpowder. These examinations will normally result in the determination whether a firearm was in contact/near contact with a target, or at an intermediate or distant range from the target, at the time of discharge.
- Review and examination of reports, images or other information to assist in the analysis of trajectories or in the reconstruction of events.

CONCLUSIONS

Microscopic conclusions will normally be reported as:

- The identification of a specific firearm to fired bullets or cartridge cases.
- The elimination of a specific firearm as having fired a bullet or cartridge case evidence.
- The identification or elimination of a specific firearm to fired bullet or cartridge case evidence cannot be made (inconclusive).
- The submitted evidence is unsuitable for microscopic comparison.

OPERABILITY AND TEST FIRES

The Crime Laboratory Firearms Section has developed a video for agencies to do their own test fires/operability testing. This video demonstrates how to test firearms, which will then allow the firearms scientists to focus on the critical forensic analysis in the laboratory. There are certain circumstances that might require submission of an operability case. Those circumstances include but are not limited to full auto conversions, damaged firearms, and other non-functional firearms. The laboratory will also continue the operability testing on cases that require microscopic comparison. Turning this service back to our customer/user agencies allows us to focus on cases requiring our work in the laboratory. The video can be found on the FLSB website of the WSP [Firearms Operability Video](#).

OTHER EXAMINATIONS

- Elemental analyses of gunshot residue for the presence of lead, barium and antimony are not conducted.
- The attempted association of a specific fired bullet to a specific discharged cartridge case is not normally conducted.
- Elemental analysis of lead bullets or bullet cores for identification to a lot or box of ammunition is not conducted.

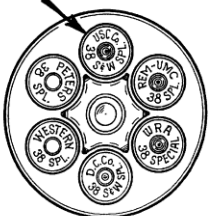
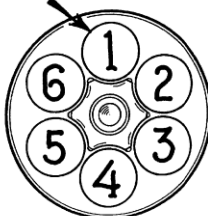
COLLECTION AND PRESERVATION

- All items should be inventoried. Record the source, date, time, agency case number, item number, and description of the item. Descriptions of firearms should include the serial number (do not confuse with part numbers), make, model, caliber, and the condition when found (i.e., loaded or unloaded, cocked or uncocked, safety on or off, etc.).
- The area of recovery should be measured, sketched, and photographed, showing the positions of the item.
- Unload the firearm, if possible.
- Handle carefully in order to preserve trace evidence. Do not remove the trace evidence unless the entire object cannot be submitted. Before removing, describe the location of the trace evidence and photograph or sketch the evidence in place.

UNLOADING A REVOLVER

- Place a line on the cylinder on each side of the top strap with a pencil or felt pen prior to opening or moving the cylinder. This will inform the examiner which chamber was at the top.
- While pointing the barrel downward, open the cylinder; before moving the cylinder or removing the cartridges, make a diagram of the cylinder. Number the chambers, starting at the top and going clockwise; note any cartridge in each chamber, whether the cartridge has been fired, and the headstamp information, indicating the manufacturer. See example:

HEADSTAMP

		Chamber #	Condition	Information
FACING REAR OF CYLINDER				
APPEARANCE OF CYLINDER AS RECOVERED		1	Fired	S&W
		2	Fired	REM
DIAGRAM TO BE MADE BY OFFICER RECOVERING WEAPON		3	Fired	WRA
		4	Loaded	S&W
		5	Loaded	WES
		6	Loaded	PET

- Each cartridge or cartridge case that is removed must be placed in an individual container. The number of the chamber from which it was removed must be noted on the container.
- The firearm and cartridges must be marked prior to packaging and shipping. A tag is a good method of marking the firearm.
- Unfired cartridges should be marked with an indelible felt tip pen along the case.
- Fired cartridge cases should be handled in a similar fashion as cartridge cases collected at a scene. Note - a mark made with a permanent marker may be removed during examination.
- **Never** mark the base of a fired or unfired cartridge.

UNLOADING A SEMI-AUTOMATIC PISTOL

- Remove the magazine. Handle the magazine with care if it is to be processed for latent prints or DNA. Do not remove any cartridges. Mark the magazine. Package the magazine in a paper envelope, small box, etc. Seal and label the container. Submit with the firearm.
- Remove the live cartridges, if any, from the chamber. Mark the cartridge, indicating that it was removed from the chamber, place in a container, and seal and label the container. Submit with the firearm.
- Note the serial number of the firearm for proper identification.

UNLOADING BLACK POWDER FIREARMS

Percussion cap revolvers –

- Remove the percussion caps from the cylinder and then remove the cylinder from the frame.
- Do not attempt to unload the individual cylinder cavities.

Percussion cap rifles –

- Remove the percussion cap. Do not attempt to unload the firearm.

Flint Lock pistols and rifles –

- Remove the flint and any powder in the flash pan. Do not attempt to unload the firearm.

Call the Crime Laboratory for shipping instructions.

RECOVERED BULLETS, PROJECTILES, AND FRAGMENTS

- Each bullet or fragment recovered from the crime scene should be wrapped separately in tissue paper and then placed in a small box (e.g., a pill box) or envelope. Seal and label the container. The fine striations on the bullet must be protected. Do not use any cotton material for wrapping—it may be confused with fibers from clothing involved in the case.
- If a bullet is buried in a wall or other object, cut around the bullet. Remove the material containing the bullet. Do not probe the hole or try to dig out the bullet—it may damage the bullet. Wrap, place in a carton, and seal and label the carton.
- Do not touch recovered bullets with bare fingers. Possible traces of blood on the bullet could be contaminated by handling. Use a clean, unused pair of plastic gloves or pick up with clean tissue.
- Shot pellets should be collected and submitted in the same manner as bullets.
- Search for shot shell wads and shot cups whenever a shotgun is involved.
- Shot patterns should be measured, sketched, and photographed. If possible, the surface containing the shot pattern should be recovered.
- Bullets and fragments recovered at an autopsy should be carefully rinsed and dried. Wrap in tissue paper and place in a small carton or envelope. Seal and label the container.

FIRED CARTRIDGE CASES AT SCENE

- Consider whether the items will be submitted for processing for fingerprints and/or DNA. Wear gloves to collect the evidence and prevent potential contamination.

- Each cartridge case should be placed in a small carton or envelope. Make sure the packing is appropriately labeled. Do not mark the cartridge case on the base or on the side.

GUNSHOT RESIDUE FOR DISTANCE DETERMINATION

If fired at close range, a firearm will discharge partially burned and unburned gunpowder particles onto the target surface. The appearance (i.e., the pattern and density of the particles) may assist in establishing the distance between the firearm and the target surface.

In addition to gunpowder particles, soot, vaporous lead, and small lead particles are also produced during the discharge of a firearm and these substances can be found on a target surface around a suspected bullet hole. These various products of the discharge of a firearm can be identified using chemical testing and the results of the various chemical tests can also be used to determine whether a firearm was in contact/near contact with a target, at an intermediate range from a target, or a distant range from a target at the time of discharge.

CAUTION:

Chemical testing of clothing may have a detrimental effect on retesting and subsequent testing may not produce results similar to the original.

- If clothing is submitted, each article must be air-dried and packaged separately. Package the clothing in paper bags or wrap in brown paper. Do not package in plastic bags. Seal and label the containers, noting the contents.
- If the pattern is on skin, 1:1 color photographs of the wound and entire pattern should be submitted, before and after the wound area is cleaned. A scale or ruler must be included in the photographs. Close-up photos of the entry and exit wounds should be submitted as well as close-up photos of typical gunpowder particles in the pattern. Some of the particles should be picked off and folded in a piece of clean paper. The paper should be sealed, labeled, and placed in an envelope. Seal and label the envelope.
- The laboratory should be informed of the locations of the entry and exit wounds found on the body. Copies of autopsy or medical reports may be helpful in the course of the analysis and should be submitted to the laboratory.
- The suspect firearm and the same type of ammunition should be submitted. The gunpowder pattern on the proximity test target material may be compared to the patterns visible on or chemically developed on the submitted clothing.
- In the case of black powder firearms, the unknown factors of powder type and amount will be limiting factors in trying to establish distances between the firearm and target.

FIREARMS PARTS

- It is important to collect any and all firearm parts found at the crime scene.
- It may be possible to reassemble the firearm for testing; a firearm type and manufacture may be identified.
- All of the collected parts may not be from the same firearm.
- The parts may be packaged in a box (preferred), a paper bag, an envelope, etc. Parts packaged in a box may be strapped down to prevent shifting during transport. The packaging should be marked with the appropriate identifying marks, such as agency case number, item number, and description of the item.

SERIAL NUMBER RESTORATION

- The serial number on a firearm (as well as office equipment, bicycles, machinery, skis, etc.) may be obliterated to conceal ownership. Chemical processing can often restore the number. Do not wipe or abrade the surface.

SHIPPING FIREARMS AND RELATED EVIDENCE

- Package the firearm in a suitable box. Firearms packaged in a box should be strapped down with zip ties to prevent shifting during transport. Mark the sealed box with the appropriate identifying marks, such as agency case number, evidence item number, and description of the item.
- When packaging semiautomatic pistols, place a zip-tie through the magazine well and out of the ejection port to render the firearm safe. Please do not put the zip-tie inside the barrel of the pistol as this may disturb trace evidence within the bore of the barrel.
- Live ammunition cannot be sent through the U.S. Postal Service. (https://pe.usps.com/text/pub52/pub52c3_019.htm). Ship by United Parcel Service (UPS), Fed-Ex, or other common carrier.
- Federal Law requires that ammunition must be shipped separately from firearms; check with your preferred carrier for more information.
- All firearms must be unloaded before being shipped or hand-carried to the laboratory. If the firearm is difficult to unload, contact the crime laboratory for assistance. Secure the weapon in a new cardboard box with plastic ties to prevent movement.
- Handguns shipped via UPS must be shipped via Next Day Air. Please refer to the requirements of your normal carrier for more information.
- Long guns may be shipped via UPS ground.
- Other carriers may have rules regarding the shipping of firearms and ammunition. Please contact the carrier with specific questions regarding the shipping of this type of evidence.

<https://www.ups.com/us/en/help-center/packaging-and-supplies/special-care-shipments/firearms.page>

http://images.fedex.com/us/services/pdf/Service_Guide_2017.pdf

TOOL MARK EVIDENCE

INTRODUCTION

A tool mark is a mark made by one object on the surface of another, softer object. Although these marks are generally made at the entry point of a burglary, various kinds of tool marks can be found elsewhere, such as fractured knife blades, cut marks on wire, abrasions left on a vehicle, cut marks on a padlock, and machine marks on a metallic surface.

TYPES OF TOOL MARKS

- Some tool marks only show the basic shape of the tool. This type of tool mark lacks specific detail that can single out a particular tool; only the general shape and size of the tool can be determined—wood impressions are often of this type. Since wood will fracture or partially "spring" back, often only the general form and size of the tool can be determined.
- The tool mark that is of more value is the type that consists of striations (a series of narrow, fine grooves, some of which are microscopic) and indentations which show the individual characteristics of the tool. These marks can often lead to the identification of a particular tool.

NOTE: *To examine the tool mark closely, a magnifying lens is helpful. If the tool mark does not have sufficient detail, a decision must be made whether the tool mark is of value and worth expending time and effort to collect and to be examined by the crime laboratory.*

METHODS USED

The submission of a tool with a questioned/unknown tool mark will normally result in the making of test tool marks in an appropriate medium using the submitted tool. These test tool marks will be microscopically compared to each other and then compared with the questioned/unknown tool mark. Casting of the test tool marks may be required depending on the type of questioned/ unknown tool mark submitted.

CONCLUSIONS

Microscopic comparisons will normally be reported as:

- The identification of the submitted tool to the questioned tool mark.
- The elimination of the submitted tool from the questioned tool mark.
- The identification or elimination of the submitted tool to the questioned tool mark cannot be determined (inconclusive).
- The submitted tool mark is unsuitable for microscopic comparison.

OTHER EXAMINATIONS

Impression tool marks (i.e., footwear and tire tracks) and fracture matches are assigned to the Materials Analysis Unit.

PRECAUTIONS

- Do not attempt to fit a suspected tool into the questioned mark. The tool mark may be damaged, the tool may be altered, and trace evidence may be lost or contaminated.
- In the case of cut wire type materials, mark the end of the wire type material cut by an agency representative during the retrieval of the evidence with paint, permanent marker, or wrap with tape, indicating this is a cut produced by a known tool. This provides information to the laboratory as to which end of the wire type material is to be compared with the suspected tool.
- Care must be taken to protect the suspected tool so that the face of the tool is not damaged, thus changing the tool mark it will produce. Protect the face of the tool with soft tissue paper.
- Handle the tool with gloves, as DNA might be recovered from a tool left at the scene.
- Protect any trace material on the face of the tool. Paint, metal particles, and other materials from a surface frequently adhere to the tool. The trace material can be compared with samples of the surface containing the tool mark.
- Samples of the surface adjacent to the tool mark must be taken. Later, when the suspect tool is recovered, trace materials on the tool can be compared to the samples taken at the scene. This information can be very valuable, particularly if the tool mark comparison is not definitive.

PRESERVATION OF TOOL MARKS

- When possible, submit the object containing the tool mark. This may entail submitting a drawer, a metal screen door, or cutting out a portion of the object containing the tool mark.
- Close-up photos that include a scale must be made if the object containing the tool mark cannot be submitted. The film plane should be parallel to the tool mark. Oblique lighting will increase details visible in the photo.
- It is important that the tool mark be kept clean and dry. An exception is when a tool mark on a metal surface is subject to rusting. To retard rusting, coat the tool mark with a light film of oil.
- Casting of the tool mark may be done as a last resort. A cast will never completely replicate the details of the original tool mark. Suitable silicone rubber casting materials, such as Mikrosil, can replicate a significant amount of the details in a tool mark. A formulation with a lesser degree of replication will cause a loss of the finer details in the tool mark and reduce the chances for a definite conclusion.
- Casting should be done by an experienced person. Improper casting may produce a worthless cast and damage the tool mark. **DO NOT PRACTICE ON THE EVIDENCE.**

TOOL FRAGMENTS

- At crime scenes, burglary tools may break during the commission of the crime. Fragments of the broken tool may be found near the scene or even in the tool mark itself.
- Since these fragments may be very small, a flashlight held obliquely to the floor surface is helpful. A magnet may also be used to locate the fragments that contain iron.
- The recovered fragment may be fitted to the suspect's broken tool and constitute what is called a physical match. The physical match may identify the tool as the one used at the crime scene.

NATIONAL INTEGRATED BALLISTIC INFORMATION NETWORK (NIBIN) EVIDENCE

The National Integrated Ballistic Information Network (NIBIN) has greatly increased the ability of the Firearms Sections to identify incidents in which the same firearm was used. Often, NIBIN can offer new leads in “dead end” cases and reduce the number of unsolved firearm cases.

NIBIN is located in the Tacoma and Seattle Crime Laboratories. If there are any questions regarding submissions for NIBIN entry, please contact the Firearms Section at one of the three labs that handle firearms evidence.

METHODS USED

- Images of evidence and test fired cartridge cases will be entered into the NIBIN database for correlation with existing stored images. Automatic searches of NIBIN Region 15 (Washington, Idaho, Montana, and Northern California) occur when a cartridge case is entered into NIBIN. The cartridge case will also be searched any time a new cartridge case with appropriate characteristics is entered into NIBIN. Agencies can make a special request to have a cartridge case searched against any specific area that is outside of NIBIN Region 15, but is within the United States. The stored images of cartridge cases are maintained indefinitely.
- The submitting agency representative will be contacted regarding a potential association between submitted evidence items or test fired cartridge cases and existing database images.
- If needed for warrants, arrests, trial, etc., confirmation of potential associations between submitted evidence items or test fired cartridge cases and existing database images may be requested and the cartridge cases from the involved cases will be examined by a Firearms Examiner. The results of this examination will be communicated to the representatives of the agencies involved.

SUBMISSIONS FOR NIBIN ENTRY

The following items may be submitted for NIBIN entry:

- Recovered fired cartridge cases (evidence).
- Test fired cartridge cases – from all firearms types except revolvers and derringers.
- Firearms, except revolvers and derringers (see the Firearms Evidence portion of this manual to determine when submission of a firearm would be appropriate for NIBIN entry only).

The Crime Laboratory Division Firearms Section has developed a video for agencies to do their own firearms test fires/operability testing for NIBIN/IBIS entry. The video is entitled WSP Firearms Operability Testing Process and is located on the WSP website. ([Firearms Operability Video](#))

Test fires are now considered evidence items and must be submitted as evidence. After the test fires are entered into the NIBIN database, the evidence will be returned to the submitting agency.

Please submit your test fires in a test fire envelope or other appropriate packaging in a sealed condition. In order to process your test fires, all information needs to be completed on the test fire envelope except the “laboratory number” and “date entered” boxes. Test fire envelopes are available from your local firearms section. If not using a test fire envelope, include the following firearm information with your request for NIBIN entry:

- Date seized
- Make
- Model
- Caliber
- Serial number
- Type (pistol, rifle, shotgun)

FIREARMS

Firearms should be submitted as instructed in the Firearms Evidence portion of this manual.

Please send all firearms to the lab to which you normally submit firearms.

CARTRIDGE CASES

Cartridge cases should be submitted as instructed in the Firearms Evidence portion of this manual.

Cartridge cases for NIBIN entry only may be shipped directly to the Tacoma or Seattle Crime Laboratories.

Cartridge cases that require an examination of any type in addition to NIBIN entry must go to the lab to which they would normally be submitted.

OTHER EXAMINATIONS

No evidence bullets or bullets produced during the test firing of firearms are currently being entered into the NIBIN database.

The Crime Laboratory Firearms Section now also offers the option of walk-in NIBIN entry at the Seattle and Tacoma Crime Laboratories. For high priority cases, a representative of the agency may bring evidence to the lab without a Request For Laboratory Examination. The evidence will not be submitted to the possession of the lab, but will remain in the custody of the agency representative while a member of the Crime Laboratory Firearms Section performs the NIBIN entry. Please contact the Firearms Sections of the Seattle or Tacoma Crime Laboratories to use this service.

FORENSIC DOCUMENT EVIDENCE

The Washington State Patrol Questioned Document Section provides a wide variety of services related to documents involved in criminal investigations to our customer agencies. Those services include:

- **Handwriting and signature examinations** to identify writers and signers of documents that are related to criminal investigations.
- **Indented writing examination** to detect and decipher indented writing and determine the sources of anonymous or questioned documents.
- **Identification of the processes used to create documents**, including machine-generated documents, typewriting, photocopies, graphic arts processes, ink and paper examinations that are important in counterfeiting investigations.
- **Physical matches** to associate torn or cut documents with their sources.
- **Alterations** to genuine documents.
- In-house examination or referral to outside experts regarding **ink examination and dating, and differentiation of paper**.
- In-house examination or referral to outside experts regarding **document restoration**. This includes charred, soaked, torn, shredded, or otherwise damaged documents.

A document is defined as anything printed, written, typed, or reproduced that is relied upon to record or prove facts in an investigation. The role of documents is important in a society of contracts, wills, checks, and promissory notes, as well as threat and harassment notes, ransom notes, professional records and counterfeiting. The authenticity of these documents is often a critical issue to the resolution of a dispute or crime.

STRUCTURE OF EXAMINATIONS

The typical **handwriting or signature examination** case has three parts:

- 1) The questioned items which are submitted by the investigator. It is always preferable to receive the original of all documents. Examinations can be made from copies; however, the clarity of the copy can affect the interpretation results of the evidence and reported conclusions.
- 2) Standards (known samples) of the suspect's writing.
- 3) Standards (known samples) of the victim's writing.

Handwriting and signature examinations might identify the writer of a check, letter, or questioned signature. Handwriting examinations might also determine that an individual is not the writer.

Writing of similar kind is needed for comparison (i.e. known handwriting to questioned handwriting, known hand printing to questioned hand printing, and known signatures to questioned signatures). Additionally, the same letter and word combinations are very important components for meaningful examinations and conclusions. *Handwriting examination must be performed prior to latent fingerprint analysis.*

Indented writing examinations can yield information regarding writing that appears on several sheets of paper below the source page. Indented writing is created by the transfer of the writing instrument's pressure track from the page upon which the writing occurs to the pages beneath. This is helpful in such

cases as the investigation of anonymous notes. Such notes can be processed for indented writing, and they often yield writing that occurred in a tablet several pages above the questioned note. Evidence recovered for indented writing examinations should be well-protected to prevent damage or additional indentation created during evidence processing.

Identification of the processes used to create documents can yield valuable information regarding the sources of documents and the determination of authenticity in counterfeiting cases. Examination of machine-generated documents can determine the type and, in certain cases, the specific machine used to create them. This includes typewriters, photocopiers, printers, facsimile machines, commercial graphic devices and systems. Especially important to counterfeiting cases is the submission of an authentic model of the document in question to which the suspected counterfeit can be compared. Examples include title certificates, checks, passports, and identification cards.

Among the most common cases involving **physical matches** is the microscopic association of pages to a source, such as a writing tablet or notebook. Careful attention to the preservation of the evidence will insure that the critical areas of the evidence do not sustain damage that might interfere with physical match determination.

Alterations to genuine documents are detectable using a variety of laboratory examination methods. These methods can determine data regarding alteration techniques and restoration of the original information that was altered.

Ink examination and dating, and the differentiation of paper are highly-specialized sub-disciplines of document examination. The Questioned Documents Section can provide services related to these examinations, and can also refer cases to experts outside our system who are imminently qualified to examine such evidence.

The Questioned Documents Section provides services in the highly specialized sub-discipline of **document restoration**. Some in-house services are available for such cases, and we can refer evidence to outside experts who specialize in various types of restoration work.

HANDLING AND SHIPPING OF EVIDENCE

Questioned documents generally do not require special handling or procedures. However, document evidence should be protected from excessive handling. There are two notable exceptions that require special handling:

Indented writings

Indented writing is the impression from the writing instrument that transfers to the sheets under the sheet containing the writing. These sheets should be protected from fingerprints, excessive handling, and additional impressions (e.g., do not write on the envelope after placing indented writing evidence inside).

Indented writing evidence must be examined before being processed for fingerprints. Fingerprint processing will destroy indented writing.

Charred documents

Charred documents require hand delivery. They should be placed in a box lined with cotton. Do not attempt to separate the pages. The Spokane Crime Lab should be consulted before collecting and submitting.

SUBMISSION

Separate documents into at least two groups and submit in separate envelopes, Questioned Documents and Known Documents. If you have numerous writers, known documents should additionally be separated into groups by writers (K1, K2...). Each item of evidence must have the case number and a unique identifier. Evidence should be sealed with tape, with initials and date across the taped seal. If you have questions at any time, please contact the QD Section.

Questioned Documents: Documents that are suspected of being forged, altered, counterfeit, etc.

- Place the questioned items together in a labeled envelope and seal. If you suspect multiple writers among the questioned documents, group accordingly and submit in separate envelopes.
- Do not write on the documents as impression writing may be recovered. If indented writing examinations are requested, sandwich between cardboard/cardstock and place in envelope.
- Do not fold or alter the documents. Keep them in the original state.
- Wear gloves and take appropriate measures to preserve fingerprint evidence. Please submit all questioned documents to the Questioned Document Section before processing for latent prints.

Known Documents: Documents containing handwriting from a known source and will be used for comparison to the questioned writing.

- Place the known documents from each writer in separate labeled envelopes and seal.
- Obtain known writing samples from victim(s).
- Submit collected writings, those writings that are not requested. This type of known writing is most valuable in determining authorship.

The known documents must be of the same style of writing as the questioned items (i.e., hand printing to hand printing, handwriting to handwriting).

Requested standards are obtained through use of Crime Lab Division *Handwriting Exemplar Packet*. The exemplar will provide sufficient writing for examination. All four pages of the exemplar are necessary to obtain a representative sample of the subject's writing. Fully one-half of the exemplar is designed for the investigator to dictate to the subject the various signatures, amounts, numerals, phrases, and other writings specific to the case. Check samples are also included in the exemplar packet for check cases. Additional paper may also be used along with the exemplar packet.

You must be familiar with the questioned writing in order to dictate to the subject the correct questioned names, amounts, dates, payees, phrases, or signatures.

- Each questioned signature, name, word, etc., should be dictated to the subject 15 to 20 times.
- The various names, dates, questioned entries, etc., should be dictated in a random manner (e.g., "John Smith, four hundred, John, Smithsonian, Smith and Johnson," rather than "John Smith" 20 consecutive times).
- The exemplar should be filled out by the subject with a black ink ballpoint pen. Do not use a fiber tip or rolling marker pen.
- The Questioned Documents Section Handwriting Exemplar Form can be obtained by contacting the Spokane Crime Laboratory at 509-625-5401.

- Handwriting exemplars must be packaged, labeled, and treated as evidence when submitted to the crime laboratory.

Collected standards are any writings that will be accepted in court as the genuine writing of the subject. Cancelled checks, business records, court documents, payroll checks, letters, and diaries are examples of collected standards. Contact the QD Section for ideas of collected standards.

There are some cases where the standard exemplar is not the best sample. The questioned item may not be typical of the normal writing situation. The investigator should obtain writing standards under circumstances similar to those of the questioned writings. For example,

- Graffiti on a wall: Have the subject write on a piece of paper taped to the wall at a similar height/position.
- Anonymous writing on unlined paper: Have the subject write dictated, verbatim samples on unlined paper.

If taking photographs of threats or graffiti, please take high quality, properly exposed, correctly-focused photos made with the camera perpendicular to the writing surface. If possible use a tripod and NO flash. More than one photo is recommended. If it is a digital photo, then please record original files on a CD or prints on photo-quality paper.

For questions regarding this information or to discuss the specific aspects of your case please contact the Questioned Documents Section at the Spokane Crime Laboratory.

Washington State Patrol
Spokane Crime Laboratory
Questioned Documents Section
580 W 7th St
Cheney, WA 99004
(509) 625-5401

Frequently Asked Questions

Do the forensic document examiners (FDE) administer the exemplars? No, we do not. We are available if you have questions, but we do not administer the exemplars. We leave that to the investigator.

Can we send the documents to you by fax or email? No, we cannot accept documents this way for examination requests. Keep in mind that this is potentially evidence and needs to be treated as such. All evidence for examination must be submitted as outlined in this Guide.

Can a FDE determine gender, age, ethnicity, personality, or mental state from writing? No.

LATENT PRINTS EVIDENCE

INTRODUCTION

Latent prints are a widely recognized means of personal identification. Most crime scene evidence has the potential to contain latent prints. One should assume that latent prints are present on all objects handled and process or collect these pieces of evidence accordingly. Latent prints are some of the most fragile evidence which may be collected at a crime scene. Latent prints are susceptible to destruction and may be destroyed simply by coming into contact with other items of evidence or a package container. Proper collection, handling, and packaging of the evidence are critical.

SAFETY CONSIDERATIONS

Knives and broken glass may be encountered as objects that have latent prints on them. Personal protective equipment should be used in the collection of these types of objects and they must be packaged appropriately in puncture resistant containers

Do not submit hypodermic needles (or syringes with the needles attached), razor blades, or other sharps without management approval. The Crime Laboratory will not accept any evidence that includes a needle, regardless of packaging, without prior approval.

NOTE: *The cutting or shearing of a needle from a syringe is prohibited by federal and state regulations.[WAC 296-823-14010 and WAC 296-823-18030]*

All bloodstained objects should be treated as potential sources of bloodborne pathogens and appropriate protective measures (such as personal protective equipment) should be used when collecting contaminated or potentially contaminated evidence. Any known or suspected biohazard contamination should be noted on the Request for Laboratory Examination form.

All firearms must be unloaded before being shipped or hand-carried to the laboratory. If the firearm is difficult to unload, contact the crime laboratory for assistance. Federal Law requires that ammunition must be shipped separately (in a separate shipping container) from firearms; check with your preferred carrier for more information.

DEFINITIONS

Latent Print is a transferred impression of friction ridge detail that may not be readily visible.

Known Prints (Known prints can also be referred to as exemplars or elimination prints) are the prints of an individual, associated with a known or claimed identity, and deliberately recorded electronically, by ink, or by another medium. Recording comprehensive prints (pictured below) can help ensure the entirety of the friction ridge surfaces of fingers and palms are recorded. Submission of comprehensive known prints provides the laboratory with the greatest opportunity to conduct complete latent print comparisons.

Alternate Light Source is any light source, other than a laser, used to excite luminescence of latent prints,

body fluids, or other items. These systems usually use various filters in conjunction with certain powders or chemicals to cause latent prints to fluoresce.

Automated Biometric Identification System (ABIS) is a computer system (previously known as the Automated Fingerprint Identification System) that stores, analyzes, and searches finger or palm print images against a database.

Next Generation Identification (NGI) is the FBI's national AFIS (previously known as IAFIS or the Integrated Automated Fingerprint Identification System).

CAPABILITIES AND SERVICES

The primary functions of the Latent Prints section is to examine and process items of evidence for latent prints, determine if prints are suitable for comparison, compare unknown prints to known prints, and search unknown prints in the ABIS system. The results of all examinations will be compiled in a case report which is returned to the requestor or other interested parties.

The Washington State Patrol (WSP) contracts with the Western Identification Network (WIN), to operate and maintain the Automated Biometric Identification System software and database. WIN is a consortium of several western states (Washington, Oregon, Idaho, Nevada, Utah, Wyoming, Montana, and Alaska), referred to as central sites, sharing a common ABIS database. When searching a print in the ABIS database, the WSP can search Washington records alone, each central site member, some combination of central site members, or all central site members. In addition, access may be provided to other national, state, or local state databases through the WIN network (e.g. California DOJ and the FBI's NGI).

Latent impressions which meet the quality requirements to be searched in the WIN ABIS are searched against databases of known tenprint or palm print exemplars. Impressions which are not identified as a result of the search are routinely registered into an unidentified latent prints database. As new exemplars are submitted to WIN or NGI, they are automatically searched against all registered latents in the respective unidentified latent prints database. When a potential match is generated, the original submitting agency is notified and a new request may be opened to compare the generated subject to the unidentified latents from the original request.

Retention of unidentified impressions in the WIN database is limited by an expiration date linked to the offense. When multiple offenses are listed, the offense with the longer statute of limitations is generally chosen. When the expiration date is reached, the impression is removed from the database and is no longer subject to automated searches.

Registration into the FBI unidentified latents database is controlled by the FBI.

If a new LI search of a registered latent is desired, a new request may be submitted. These requests will be accepted on a case by case basis with consideration given to the specific circumstances of the case.

COLLECTION

Evidence should be examined thoroughly for latent prints prior to collection. All visible impressions should be photographed.

Latent prints developed by powder processing methods should be lifted and submitted to the laboratory.

If the lift process may pose a challenge, the latent prints should be photographed prior to lifting. Lift tape may be placed over the impression, left in place without lifting, and the item submitted to the laboratory for examination.

Latent lift cards should be documented with the location and orientation of the latent print. Please provide written information and a simple sketch of the object to describe the location from where the lift was made. Small directional arrows are helpful in orienting the placement of a latent print. Written information should include the date, case number, crime scene location, the object from which the lift is made, and name of person making the lift. If any of the officer's prints appear on the lift tape after lifting then those impressions should be crossed out and initialed (figures 1 and 2).



Figure 1

Date	Crime	Case No.	— Sketch and/or Remarks — 
6/30/15	Burg.	15Z1234	
Victim Chip Chuck			
Address of Incident 18A Big Tree Ln			
Location of Latent Prints Lifted Door Window			
Prints Lifted by Diego Garcia		ID No. XXX	
Lightning Powder • (800) 347-1200 www.lightningpowder.com			
Re-Order #1-2501			

Figure 2

If any evidence is to be submitted for processing with chemicals the officer should refrain from the use of powder processing as powders could interfere with chemical processing.

Latent prints should be photographed using a high resolution digital SLR camera. The largest file format available should be used and images should be captured in a loss-less file format such as .tiff or RAW. The camera should be perpendicular (at a right angle) to the latent print so that the camera sensor is parallel with the latent print. Every attempt should be made to fill the frame with the latent print to ensure that the maximum amount of detail is recorded and that the image is captured at a minimum of 1000ppi. The latent print should first be photographed without a scale to show the latent print in-situ on the object. A scale should then be placed next to the print and on the same plane. The latent print should then be re-photographed. The scale is important to allow the image to be sized 1:1 for comparison and possible search of the ABIS system.

Digital images should be burned to a CD or DVD for submission to the laboratory.

Known Exemplars

The requestor should take inked prints from all persons known to have legitimate access to the evidence (elimination prints) to allow for comparison against any latent prints recovered. All ten print cards and pages included in a set of exemplars should be labeled with the identifying information of the subject as well as the date and initials of the individual recording the exemplars. These exemplars should be treated like items of evidence and should be packaged accordingly. Alternatively if individuals already have known prints on file, list their name, date of birth, and SID number on the laboratory request. Latent prints recovered from items of evidence often include palms or prints made from the second or third joint areas of the fingers. For this reason it is always best to obtain comprehensive known prints (major case prints) for comparison.

A properly inked and rolled 10-print card should have all ten fingers and thumbs rolled nail to nail with

minimal smears, along with plain (or flat) impressions at the bottom of the card.

In addition, each finger and thumb should have the center, both sides, and extreme tips inked and recorded (figure 3).



Figure 3

The palms should be inked from the tips of the fingers to the base of the wrist or the wrist crease. The outside of the palm should also be inked and recorded separately which is known as the ‘writer’s palm’ (figure 4).



Figure 4

Post Mortem Prints

In homicide and death investigation cases, the agency should make every effort to obtain a complete comprehensive record of all friction ridge detail. The laboratory should be contacted if assistance is needed.

If it becomes necessary to remove the hands or fingers from the body, notify the laboratory in advance of its intent to deliver the body parts in person. **Do not send body parts through the mail or other carrier services.**

HANDLING AND PACKAGING

REMINDER: Prohibited items include: Explosives, flammable liquids, razor blades, and syringes with needles.

- Non-porous items (glass, aluminum cans, plastic bottles) should be packaged in containers to limit movement while in transit. Items should be submitted in separate containers if possible. If multiple items are submitted in the same container ensure the separate items will not contaminate others (leaking or cross contamination of biological substances). Items should be handled as little as possible and in a manner to avoid those areas that would be handled normally. Unnecessary layers of packaging and handling can easily damage latent impressions.
- **Do not pack the sealed evidence container with “filler” material (shredded paper, foam peanuts); these materials risk rubbing away any latent impressions.**
- It is strongly recommended that knives, firearms, or other sharp items be packaged in cardboard boxes and secured with plastic zip-ties. Make note on the Request for Laboratory Examination of any potential hazards present.
- Porous items (paper, cardboard) may be packaged in an envelope. Multiple porous items may be packaged in the same container. Handling of these items should be kept to a minimum even with gloves as glove marks can interfere with the development of latent impressions.
- Any wet items should be completely air-dried prior to submission.
- Adhesive tape, if possible, should be placed onto a sheet protector or a sheet of heavy plastic. Avoid "wadding" the tape. Do not package tape in paper containers.
- Latent print lift cards should be packaged in a properly sealed envelope or plastic bag of an appropriate size.
- Multiple lift cards may be submitted in the same packaging provided that each lift card is labeled with a unique identifying number and that the total number of lift cards contained is reflected on the outer packaging.
- Friction ridge exemplars should be packaged in a properly sealed envelope or plastic bag of an appropriate size.
- Latent lift cards collected at clandestine laboratories must be properly packaged to protect the health and safety of Crime Laboratory personnel. If latent print lift cards from clandestine laboratories are not packaged properly the evidence cannot be accepted. To package the lift cards properly, seal each latent lift card individually in plastic bags that have not been exposed to any potential contamination.
 - Note: When latent print processing is requested on items recovered from a suspected clandestine laboratory such as glassware, plastic baggies, and chemical containers, please call the WSP-SWAT team for assistance. Crime Laboratory personnel will not process evidence from clandestine laboratory “hot zones” for latent prints due to safety considerations for laboratory personnel.

Section Two

HIGH TECH CRIMES UNIT

DIGITAL EVIDENCE

INTRODUCTION

The Washington State Patrol's High Tech Crime Unit (HTCU) provides city, county, state, and federal law enforcement agencies with digital forensic technical support and training; and in accordance with established practices and standards of digital forensics processing, recover evidence that may exist on computer hard drives, cell phones and other digital media for use in related criminal and internal investigations.

ABOUT THE HIGH TECH CRIME UNIT

HTCU is a full service digital evidence retrieval and analysis unit. HTCU detectives are experienced professional investigators that can retrieve evidence without damaging or altering the original data. The data can be recovered from deleted or damaged file structures.

HTCU can provide an independent, impartial, and secure investigation while revealing and preserving important evidence, which agencies use to ensure an appropriate outcome to important digital criminal investigations.

HTCU SERVICES

Recovery of Cell Phone contents including (varies based on phone model and carrier):

Decoded Data	GPS	Applications	Internet Browser
Call Logs	Home Location	WhatsApp – Chat	History
Voicemails	Favorites	Viber	Cookies
Contact Lists	Recently found locations	Fring	Bookmarks
Locations (Wi-Fi, cell towers, and GPS fixes)	Last Journey	AIM	
Images	Last Fix	TextNow	
Video Files		TextFree	
Text messages (SMS)		Google+	
Multimedia messages (MMS)		Skype	
Emails		Tiger text	
Notes		Facebook	
Installed Applications		Motion X	
User Dictionary			
Calendar			
Bluetooth Device			
Pairing History			
Chats			
GeoTag Information			
Deleted Data			

Recovery of data from computer hard drives and other digital media (cameras, SD cards, thumb drives, CDs/DVDs, etc.) including:

- Recovery of e-mail files
- Recovery of deleted files
- Recovery of Internet History files
- Recovery of financial records
- Recovery of photo/video files
- Recovery of text documents

TYPICAL INVESTIGATIONS

Internet Crimes against Children, Homicide, Rape, Child Abuse, Financial Crimes, and Narcotics.

HANDLING AND SHIPPING OF EVIDENCE

HANDLING

No attempt should be made to power up a computer taken as evidence, as this may alter/destroy information stored on the hard drive.

Hard Drives should be submitted as found when seized, i.e. if in a desktop tower the entire tower should be submitted.

External hard drives, GPS units, digital cameras and other external devices should be submitted with power and connection cables.

Batteries should be removed from laptops and submitted with the computer and the power supply.

Batteries should be removed from cell phones prior to being packaged and should be submitted with power and connection cables.

If any known biohazard is present the outside of the package will require a "BIOHAZARD" label or markings.

SHIPPING

Evidence should be shipped via UPS, Fed Ex, Certified Mail or delivered in person. When shipping digital media all items should be packaged properly with plenty of packing material. All items should include a Lab Request Form and a copy of the signed search warrant and affidavit or a signed consent to search form.

The address for shipping is:

Washington State Patrol/High Tech Crime Unit
106 11th Ave. SW, Suite 4100
Olympia, WA 98501

For questions or if delivering in person please call: 360-704-4242.

Section Three

TOXICOLOGY LABORATORY DIVISION

TOXICOLOGY LABORATORY DIVISION

2203 Airport Way S., Ste 360
Seattle WA 98134
Telephone: (206) 262-6100
FAX: (206) 262-6145

Email: toxlab@wsp.wa.gov

Website: <http://www.wsp.wa.gov/forensics/toxicology.htm>

PREFACE

In July 1999, the Washington State Toxicology Laboratory became a division within the newly formed Forensic Laboratory Services Bureau of the Washington State Patrol. The Washington State Patrol Crime Laboratory formed another division within the same bureau. It is important the user recognize that each Laboratory Division performs distinct services for the State of Washington and that the appropriate guidelines and requests forms be used for each.

The Toxicology Laboratory Division handbook is organized to provide the following:

- A description of services provided by the Toxicology Laboratory
- General guidelines for the collection, preservation, and packaging of physical evidence
- The procedure for submitting physical evidence

It is not possible for any handbook to be comprehensive for every type of case. The Toxicology Laboratory staff are always available to advise you on any specific or unusual case. You can reach a toxicologist to answer any questions you have at (206) 262-6100.

INTRODUCTION

The Toxicology Laboratory, located in Seattle, provides toxicological services to all medical examiners, coroners and law enforcement agencies within the state. Forensic toxicology answers the question: “Did drug or alcohol use contribute to or cause an individual’s death or suspected intoxication?” In support of that effort, the Toxicology Laboratory provides the following services:

- Performs toxicological examinations of blood, urine and/or other tissues collected during a death investigation; or from living individuals who were either the victim of a crime or were suspected of committing a crime in which drugs and/or alcohol may have played a role. This includes suspected driving under the influence (DUI) of intoxicating liquors and/or drugs, victims of suspected drug facilitated sexual assault (DFSA), and miscellaneous drug related incidents or crimes. The Toxicology Laboratory reserves the right to decide which method(s) to use in the detection of alcohol and drugs in submitted casework.
- Provides consultation and interpretation for medical examiners and coroners on the results of toxicology analyses in death investigation cases.
- Provides consultation and interpretation for law enforcement agencies and attorneys on the results of toxicology analyses in driving-related cases.
- Provides expert testimony in court trials, hearings, and depositions.

SAMPLE SUBMISSION

The Toxicology Laboratory in Seattle provides forensic toxicology services for all law enforcement agencies, coroners and medical examiners within the State of Washington. The laboratory analyzes blood, urine, and other biological tissues or fluids for the presence of alcohol and/or drugs.

Sample Collection Kits

The Toxicology Laboratory may provide user agencies with kits for sample collection. To order any materials, please call or email the laboratory.

NEVER submit the vacutainer collection needle or any other needle with the samples. Asking the nurse or phlebotomist to resheath the needle is subjecting him/her person to unnecessary risks and is against OSHA regulations. The Toxicology Laboratory will not accept any case that includes a needle or a syringe with the needle attached. Similarly, do not submit the betadine wipes or gauze – these are discarded upon receipt.

NOTE: The cutting or shearing of a needle from a syringe is prohibited by federal and state regulations. [WAC 296-823-14010]

Collection and Submission to the Laboratory

Tubes should be completely filled, wherever possible. Submitting partially filled tubes, or using smaller tubes, may result in partial or incomplete testing. Each assay performed requires a minimum volume of blood and the laboratory may not be able to confirm the presence of drugs if insufficient sample is submitted. In driving-related cases, the laboratory tries to reserve the second tube for the defense if independent analysis is requested.

All samples should be labeled with the subject's name and agency case number. It is important that, when labeling the blood tubes, the printing on the manufacturer's label not be covered. The Toxicology Laboratory maintains quality assurance certificates from the manufacturer for specific lot numbers and, if tubes from another source are used, the laboratory may not be able to provide a certificate.

Not only should the proper collection tube be used but it should always be **inverted** after collection to dissolve the container additives in the sample. This activity serves to preserve the sample and to prevent its coagulation; both being requirements under Washington Administrative Code 448-14-020: (<http://apps.leg.wa.gov/wac/default.aspx?cite=448-14-020>).

Once the sample has been collected, place the evidence tape over the top of the tubes/containers. The initials or other identification of the person creating the seal should be placed on the seal or across the seal onto the container.

If urine is collected, please ensure the urine cup cap is sealed correctly to prevent leaking in shipment. This is a commonly encountered problem and the entire sample may be lost. **Do not forget to label the cup with the subject's name.**

Complete the appropriate Toxicology Laboratory Request for Analysis form (refer to the appendix) and submit along with the samples. **Do not submit the Crime Lab RFLE forms.** The more information you provide in your request, the more thorough analysis the laboratory can perform. A telephone number and/or email address should be provided should any question arise during analysis. If the sample is a

DRE, a copy of the DRE “Face” Sheet should also be sent with the completed request form. Please note the column on the far right-hand side of the form is for *laboratory use only*. Current forms are available online at: <http://www.wsp.wa.gov/forensics/toxicology.htm>.

Verify that the subject’s name on the request form and the samples are the same. It is the laboratory’s policy to use the name on the specimen when there is a discrepancy.

The request form should be packaged on the outside of the box containing evidence. This allows the Property and Evidence Custodian to access the request form without handling the specimen itself. All specimens should be refrigerated until sent. Specimens may be shipped to the laboratory by US Postal Service, UPS, Federal Express or another carrier of your choice. Specimens may also be hand delivered Monday through Friday between 7:30 am and 1 pm.

CASE TYPES

There are four types of cases typically submitted to the Toxicology Laboratory: Driving Under The Influence (DUI)/Drug Recognition Expert (DRE) cases; Death Investigation cases; Drug Facilitated Sexual Assault (DFSA) cases; and Drug Investigation cases. See the appendix for the appropriate form to use. If you have questions about which form to use, do not hesitate to contact our office.

Driving Under the Influence (DUI)/Drug Recognition Expert (DRE)

Only blood/ breath alcohol and blood THC test results are admissible in court as *per se* evidence of intoxication, so when alcohol is suspected and a legal breath test is not conducted, obtain a blood sample and not urine. A blood sample is collected following a complete DRE evaluation.

Death Investigation

For deceased subjects, blood is typically the most valuable sample for postmortem toxicological testing. Peripheral blood is the specimen of choice as it is generally the most reliable for interpretation of toxicological testing, since it is less susceptible to postmortem changes.

Where available, vitreous humor fluid should be routinely collected (all available fluid should be collected, typically 3-5 mL in each eyeball). It is more than 98% water, and any drugs present in the blood will eventually equilibrate in the vitreous. Vitreous is a particularly useful sample for testing for alcohol to distinguish between postmortem production of alcohol and alcohol ingestion, since the eye as an enclosed organ is generally more resilient to microorganism infestation than other tissues.

Liver, cerebrospinal fluid, gastric contents, other tissues and maggots may also be useful specimens for analysis depending upon the circumstances of the case.

Whenever a death may involve unusual circumstances or unusual drug(s), it is advisable to contact the Toxicology Laboratory staff for guidance in sample collection.

Drug Facilitated Sexual Assault (DFSA)

Urine is typically the specimen of choice for drug facilitated sexual assaults because it provides the longest window of detection. The sooner a urine specimen is collected and refrigerated after the alleged event, the greater the chances of detecting drugs which may have been used as many of the drugs used are quickly eliminated from the body. A 50 mL urine specimen should be obtained as soon after the incident as possible, or at least within 96 hours.

Blood should additionally be collected if the patient presents within 24 hours of the alleged incident or if the patient appears sedated and/or intoxicated.

Proper labeling and documentation of all specimen containers should be ensured including details of the victim's name, date and time of collection, and approximate time after the alleged assault.

Drug Investigation

Non-driving related cases on living subjects where drugs are suspected (i.e. homicide suspect) are considered Drug Investigations. It is important to collect two full gray-top vacutainer tubes of blood as drug testing consumes more blood than alcohol testing.

If there is a significant delay between the incident and the blood collection (> 2 hours), a urine specimen may also be useful in Drug Investigation cases. In general, blood provides better evidence of drug influence than urine, but drugs will be detected for a longer time in urine than blood.

TOXICOLOGY LABORATORY APPENDIX

The following pages are copies of the Toxicology Laboratory Request for Analysis forms. Current forms can be obtained electronically at <http://www.wsp.wa.gov/forensics/toxicology.htm> or by emailing your request to toxlab@wsp.wa.gov. DO NOT SUBMIT CRIME LAB FORMS. Please note that the column on the right hand side of the form is for “Laboratory Use Only”.

Appendix A – Driving Under the Influence/DRE – Request for Analysis

Appendix B – Death Investigation – Request for Analysis

Appendix C – Drug Facilitated Sexual Assault – Request for Analysis

Appendix D – L.C.B/Drug Investigation – Request for Analysis

The following appendix is a list of drugs the laboratory screens for and their drug class. This list may change as screening methods develop.

Appendix E – Summary List of Drugs

Washington State Toxicology Laboratory - Washington State Patrol

Death Investigation – Request for Analysis

2203 Airport Way S., Ste 360
Seattle, WA 98134-2027
Phone: (206) 262-6100
Fax: (206) 262-6145
e-mail: toxlab@wsp.wa.gov

Subject's Information: (Please print clearly)

Name:

Last

First

Mi

Age:

Sex:

M ☐

F ☐

Date Sent:

Date of Death:

Agency Case #

County

Sent By: Name:

Phone: ()

Send Results To: Name:

Agency:

Address:

City:

State:

Zip:

Suspected Manner of Death:

Pending Tox: Y ☐ N ☐

Natural ☐

Accident (non traffic) ☐

Undetermined ☐

Homicide ☐

Traffic Accident ☐

Suicide: ☐

☐ Drug Related
☐ Other

Medical History: brief description of the incident and attach copy of the investigation report.

Drugs Suspected: list observations, drug history, prescriptions, etc.

Sample Information:

Specimen

Collected

Sent

Central Blood

Peripheral Blood

Urine

Gastric

Vitreous

Bile

Liver

Spleen Squeeze

Other:

Analysis Requested:

Blood Alcohol: ☐

Vitreous Alcohol: ☐

☐ performed if blood is pos

Carbon Monoxide: ☐

Drug Screen: Urine ☐

Drug Screen: Blood ☐

☐ performed if urine is pos

Other: (Specify)

Was the subject embalmed before the samples were taken? Y ☐ N ☐

State of decomposition: None ☐ Early ☐ Moderate ☐ Advanced ☐

Chain of Custody: (signature required)

From:

To:

Date:

From:

To:

Date:

From:

To:

Date:

Comments:

Laboratory Use Only Laboratory

Date:

Analyst:

Specimens Received:

☐ Blood

ml

☐ Blood Peripheral

ml

☐ Urine

ml

☐ Vitreous

ml

☐ Liquid

☐ Serum

ml

☐ Other: Please list

Evidence sealed Y ☐ N ☐

☐ Box sealed

☐ Bag sealed

☐ Tubes sealed

Samples leaked Y ☐ N ☐

☐ 1st Class

☐ UPS

☐ Certified

☐ Registered

☐ Fed Ex

☐ Campus Mail

☐ Hand Delivered

Washington State Toxicology Laboratory - Washington State Patrol																	
<div style="border: 2px solid black; padding: 5px; display: inline-block;">Drug Facilitated Sexual Assault – Request for Analysis</div>		2203 Airport Way S., Ste 360 Seattle, WA 98134-2027 Phone: (206) 262-6100 Fax: (206) 262-6145 e-mail: toxlab@wsp.wa.gov															
Victim's Information: (Please print clearly) Name: _____ <div style="text-align: center; font-size: small;">Last First Mi</div> Age: _____ Sex M: <input type="checkbox"/> F: <input type="checkbox"/>		Laboratory Use Only Laboratory # _____ Date: _____ Analyst: _____ Specimens Received: <input type="checkbox"/> Blood _____ ml <input type="checkbox"/> Blood Peripheral _____ ml <input type="checkbox"/> Urine _____ ml <input type="checkbox"/> Serum _____ ml <input type="checkbox"/> Liquid _____ ml <input type="checkbox"/> Other: Please List _____ <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>															
Agency Case # _____ County _____ Sent By: Name: _____ Phone: () _____ Send Results To: Name: _____ Agency: _____ Address: _____ City: _____ State: _____ Zip: _____																	
Alleged Incident Date: _____ Time: _____ am / pm Specimen Collection Date: _____ Time: _____ am / pm																	
Case History: Detailed description of the incident <u>and</u> attach copy of the investigation report. <div style="height: 80px; border: 1px solid black;"></div>																	
Drugs Suspected: list symptoms, observations, drug history, prescriptions, etc. <div style="height: 60px; border: 1px solid black;"></div>																	
Sample Information: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Specimen</th> <th style="text-align: left; border-bottom: 1px solid black;">Collected</th> <th style="text-align: left; border-bottom: 1px solid black;">Sent</th> </tr> </thead> <tbody> <tr> <td>Urine</td> <td>Y <input type="checkbox"/> N <input type="checkbox"/></td> <td>Y <input type="checkbox"/> N <input type="checkbox"/></td> </tr> <tr> <td>Blood</td> <td>Y <input type="checkbox"/> N <input type="checkbox"/></td> <td>Y <input type="checkbox"/> N <input type="checkbox"/></td> </tr> <tr> <td>Serum</td> <td>Y <input type="checkbox"/> N <input type="checkbox"/></td> <td>Y <input type="checkbox"/> N <input type="checkbox"/></td> </tr> <tr> <td>_____</td> <td>Y <input type="checkbox"/> N <input type="checkbox"/></td> <td>Y <input type="checkbox"/> N <input type="checkbox"/></td> </tr> </tbody> </table>		Specimen	Collected	Sent	Urine	Y <input type="checkbox"/> N <input type="checkbox"/>	Y <input type="checkbox"/> N <input type="checkbox"/>	Blood	Y <input type="checkbox"/> N <input type="checkbox"/>	Y <input type="checkbox"/> N <input type="checkbox"/>	Serum	Y <input type="checkbox"/> N <input type="checkbox"/>	Y <input type="checkbox"/> N <input type="checkbox"/>	_____	Y <input type="checkbox"/> N <input type="checkbox"/>	Y <input type="checkbox"/> N <input type="checkbox"/>	Evidence sealed Y <input type="checkbox"/> N <input type="checkbox"/> <input type="checkbox"/> Box sealed <input type="checkbox"/> Bag sealed <input type="checkbox"/> Tubes sealed Samples leaked Y <input type="checkbox"/> N <input type="checkbox"/> <input type="checkbox"/> 1 st Class <input type="checkbox"/> UPS <input type="checkbox"/> Certified <input type="checkbox"/> Registered <input type="checkbox"/> Fed Ex <input type="checkbox"/> Campus Mail <input type="checkbox"/> Hand Delivered
Specimen	Collected	Sent															
Urine	Y <input type="checkbox"/> N <input type="checkbox"/>	Y <input type="checkbox"/> N <input type="checkbox"/>															
Blood	Y <input type="checkbox"/> N <input type="checkbox"/>	Y <input type="checkbox"/> N <input type="checkbox"/>															
Serum	Y <input type="checkbox"/> N <input type="checkbox"/>	Y <input type="checkbox"/> N <input type="checkbox"/>															
_____	Y <input type="checkbox"/> N <input type="checkbox"/>	Y <input type="checkbox"/> N <input type="checkbox"/>															
Chain of Custody: (signature required) Also: Please Print Name <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">From: _____</td> <td style="width: 33%;">To: _____</td> <td style="width: 33%;">Date: _____</td> </tr> <tr> <td>From: _____</td> <td>To: _____</td> <td>Date: _____</td> </tr> <tr> <td>From: _____</td> <td>To: _____</td> <td>Date: _____</td> </tr> </table> Comments: _____		From: _____	To: _____	Date: _____	From: _____	To: _____	Date: _____	From: _____	To: _____	Date: _____							
From: _____	To: _____	Date: _____															
From: _____	To: _____	Date: _____															
From: _____	To: _____	Date: _____															

3000-215-003 (R 11/07)

Washington State Toxicology Laboratory - Washington State Patrol

L.C.B/Drug Investigation – Request for Analysis

2203 Airport Way S., Ste 360
Seattle, WA 98134-2027
Phone: (206) 262-6100
Fax: (206) 262-6145
e-mail: toxlab@wsp.wa.gov

Subject's Information: (Please print clearly)

Name: _____
Last First Mi

Date of Birth: ____/____/____ Sex: M ☐ F ☐

Date Sent: ____/____/____ Date of Incident / Arrest: ____/____/____

Agency Case # _____ County _____

Sent By: Name: _____ Phone: () _____

Send Results To: Name: _____

Agency: _____

Address: _____

City: _____ State: _____ Zip: _____

Liquor and Cannabis Board: brief description of the incident:

Drug Investigation Case History: brief description of the incident and attach copy of the investigation report:

Drugs Suspected: list symptoms, observations, drug history, prescriptions, etc.

Medications and illegal drugs of abuse suspect admits having taken:

Sample Information:

Specimen	Collected	Sent
Blood	_____	_____
Urine	_____	_____
Serum	_____	_____

Analysis Requested:

Blood Alcohol: ☐
Drug Screen:
Blood ☐ Urine ☐
Other: (Specify) _____

Laboratory Use Only Laboratory

Date:

Analyst: _____

Specimens Received:

Blood _____ ml
Blood Peripheral _____ ml
Urine _____ ml
Serum _____ ml
Liquid _____ ml
Other: Please List _____

Evidence sealed Y ☐ N ☐
☐ Box sealed
☐ Bag sealed
☐ Tubes sealed

Samples leaked Y ☐ N ☐

Chain of Custody: (signature required)

Also: Please Print Name

From:	To:	Date:
_____	_____	_____
_____	_____	_____
_____	_____	_____

Comments: _____

☐ 1st Class
☐ UPS
☐ Certified
☐ Registered
☐ Fed Ex
☐ Campus Mail
☐ Hand Delivered

Appendix E from Toxicology – Summary List of Drugs

The list provides a general overview of analytes that may be tested for by the Toxicology Laboratory, with corresponding method information and typical reporting limits. Case circumstances may require the testing of other compounds, either in-house or by an external laboratory. The Toxicology Laboratory reserves the right to decide which method(s) to use. Please contact the lab at 206-262-6100 with any questions.

Analyte Name	Confirmation Method Name	Typical Reporting Limit
Volatiles		
acetone	Headspace GC	10 mg/dL
butane	Headspace GC/MS	POS
desflurane	Headspace GC/MS	POS
difluoroethane	Headspace GC/MS	POS
ethanol	Headspace GC	0.01-0.02 g/100 mL
ethyl chloride	Headspace GC/MS	POS
isopropanol	Headspace GC	10 mg/dL
methanol	Headspace GC	10 mg/dL
sevoflurane	Headspace GC/MS	POS
toluene	Headspace GC/MS	POS
Basic Drugs		
bupropion	GC/MS for basic drugs and metabolites	0.05-0.10 mg/L
citalopram	GC/MS for basic drugs and metabolites	0.05-0.10 mg/L
cyclobenzaprine	GC/MS for basic drugs and metabolites	0.05-0.10 mg/L
dextromethorphan	GC/MS for basic drugs and metabolites	0.05-0.10 mg/L
diphenhydramine	GC/MS for basic drugs and metabolites	0.05-0.10 mg/L
ketamine	GC/MS for basic drugs and metabolites	0.05-0.10 mg/L
methadone	LC/MS for methadone	0.01 mg/L
phencyclidine (PCP)	GC/MS for phencyclidine	0.01 mg/L
tramadol	GC/MS for basic drugs and metabolites	0.05-0.10 mg/L
trazodone	LC/MS for trazodone	0.05 mg/L
venlafaxine	GC/MS for basic drugs and metabolites	0.05-0.10 mg/L
zolpidem	LC/MS for zolpidem	0.01 mg/L
Acidic/Neutral Drugs		
acetaminophen	HPLC	5.0 mg/L
carbamazepine	GC for acidic and neutral drugs	5.0 mg/L
carisoprodol	GC/MS for carisoprodol and meprobamate	1.0 mg/L
ibuprofen	GC for acidic and neutral drugs	POS (above 5.0 mg/L)
lamotrigine	GC for acidic and neutral drugs	5.0 mg/L
meprobamate	GC/MS for carisoprodol and meprobamate	1.0 mg/L
phenytoin	GC for acidic and neutral drugs	5.0 mg/L
topiramate	GC for acidic and neutral drugs	5.0 mg/L
valproic acid	GC for valproic acid	10 mg/L
CNS stimulants		
amphetamine	LC/MS/MS for amphetamines	0.01 mg/L
ephedrine	GC/MS for amphetamines	0.05 mg/L
MDA	LC/MS/MS for amphetamines	0.01 mg/L

MDMA	LC/MS/MS for amphetamines	0.01 mg/L
methamphetamine	LC/MS/MS for amphetamines	0.01 mg/L
pseudoephedrine	LC/MS/MS for amphetamines	0.01 mg/L
Barbiturates		
amobarbital	GC/MS for barbiturates	0.50 mg/L
butalbital	GC/MS for barbiturates	0.50 mg/L
pentobarbital	GC/MS for barbiturates	0.50 mg/L
phenobarbital	GC/MS for barbiturates	0.50 mg/L
secobarbital	GC/MS for barbiturates	0.50 mg/L
Cocaine and metabolites		
benzoylecgonine	GC/MS for cocaine and metabolites	0.01 mg/L
cocaethylene	GC/MS for cocaine and metabolites	0.01 mg/L
cocaine	GC/MS for cocaine and metabolites	0.01 mg/L
Antidepressants		
amitriptyline	LC/MS/MS for antidepressants	0.025 mg/L
clomipramine	LC/MS/MS for antidepressants	0.025 mg/L
desipramine	LC/MS/MS for antidepressants	0.025 mg/L
desmethylclomipramine	LC/MS/MS for antidepressants	0.025 mg/L
desmethyldoxepin	LC/MS/MS for antidepressants	0.025 mg/L
desmethylsertraline	GC/MS for antidepressants (SSRI's)	0.025 mg/L
doxepin	LC/MS/MS for antidepressants	0.025 mg/L
fluoxetine	GC/MS for antidepressants (SSRI's)	0.025 mg/L
imipramine	LC/MS/MS for antidepressants	0.025 mg/L
norfluoxetine	GC/MS for antidepressants (SSRI's)	0.025 mg/L
nortriptyline	LC/MS/MS for antidepressants	0.025 mg/L
paroxetine	HPLC for antidepressants	POS (above 0.10 mg/L)
sertraline	GC/MS for antidepressants (SSRI's)	0.025 mg/L
trimipramine	LC/MS/MS for antidepressants	0.025 mg/L
Benzodiazepines		
7-aminoclonazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	POS (above 0.01 mg/L)
7-aminoflunitrazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	POS (above 0.01 mg/L)
alpha hydroxy alprazolam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
alprazolam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
chlordiazepoxide	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
clonazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
desalkylflurazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
diazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
flunitrazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
flurazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
lorazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
midazolam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
nordiazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
oxazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
quetiapine	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.02 mg/L
temazepam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L

triazolam	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	0.01 mg/L
zopiclone	LC/MS/MS for benzodiazepines, quetiapine, and zopiclone	POS (above 0.01 mg/L)
Cannabinoids		
carboxy-THC	LC/MS/MS for cannabinoids	5.0 ng/mL
THC	LC/MS/MS for cannabinoids	1.0 ng/mL
Opiates		
6-acetylmorphine	LC/MS/MS for opiates	2 ng/mL
codeine	LC/MS/MS for opiates	0.01 mg/L
hydrocodone	LC/MS/MS for opiates	0.01 mg/L
hydromorphone	LC/MS/MS for opiates	2 ng/mL
morphine	LC/MS/MS for opiates	0.01 mg/L
oxycodone	LC/MS/MS for opiates	0.01 mg/L
oxymorphone	LC/MS/MS for opiates	0.01 mg/L
Miscellaneous Compounds - not routinely tested for unless requested		
3-methyl fentanyl	By request: LC/MS/MS	
4-methoxy-butyl fentanyl	By request: LC/MS/MS	
acetyl fentanyl	By request: LC/MS/MS	
amantadine	By request: GC/MS	
β-hydroxythiofentanyl	By request: LC/MS/MS	
brompheniramine	By request: GC/MS	
bupivacaine	By request: GC/MS	
buprenorphine	By request: LC/MS/MS	0.2 ng/mL
butyl fentanyl	By request: LC/MS/MS	
carbon monoxide	By request: Co-oximetry	5% saturation
carfentanil	By request: LC/MS/MS	
chlorpheniramine	By request: GC/MS	POS
cyanide	By request: Screen by Cyantesmo Test Strips	0.25 mg/L / POS
diltiazem	By request: GC/MS	
doxylamine	By request: GC/MS	
ethylene glycol	By request: GC/MS	POS
etizolam	By request: GC/MS	
fentanyl	By request: LC/MS/MS	0.5 ng/mL
flubromazepam	By request: GC/MS	
furanyl fentanyl	By request: LC/MS/MS	
gabapentin	By request: LC/MS	1.0 mg/L
GHB	By request: GC/MS	
guaifenesin	By request: GC/MS	
isobutyl fentanyl	By request: LC/MS/MS	
levetiracetam	By request: GC/MS	
lidocaine	By request: GC/MS	
loperamide	By request: LC/MS	POS
meperidine	By request: GC/MS	
mesoridazine	By request: GC/MS	
metaxalone	By request: GC/MS	
methocarbamol	By request: GC/MS	
methylphenidate	By request: GC/MS	

metoclopramide	By request: GC/MS	
mirtazapine	By request: GC/MS	POS
mitragynine (Kratom)	By request: GC/MS	POS
naloxone	By request: LC/MS/MS	POS (above 0.2 ng/mL)
nefazodone	By request: GC/MS	
noracetyl fentanyl	By request: LC/MS/MS	
norbuprenorphine	By request: LC/MS/MS	0.2 ng/mL
norfentanyl	By request: LC/MS/MS	0.5 ng/mL
oxcarbazepine	By request: GC/MS	
para-fluorobutyl fentanyl	By request: LC/MS/MS	
para-fluoro fentanyl	By request: LC/MS/MS	
pentazocine	By request: GC/MS	
pheniramine	By request: GC/MS	
phentermine	By request: GC/MS	
phenylpropanolamine	By request: GC/MS	
primidone	By request: GC/MS	
procaine	By request: GC/MS	
promethazine	By request: GC/MS	
propoxyphene	By request: GC/MS	
salicylates	UV-VIS spectrophotometry for salicylates	100 mg/L
strychnine	By request: GC/MS	
thioridazine	By request: GC/MS	POS
U-47700	By request: LC/MS/MS	
valeryl fentanyl	By request: LC/MS/MS	
verapamil	By request: GC/MS	
zonisamide	By request: GC/MS	
Synthetic cannabinoids ("Spice")	External Lab	
Synthetic cathinones ("Bath salts")	External Lab	
aripiprazole	External Lab	
baclofen	External Lab	
cetirizine	External Lab	
clozapine	External Lab	
duloxetine	External Lab	
haloperidol	External Lab	
hydroxyzine	External Lab	
lithium	External Lab	
LSD	External Lab	
pregabalin	External Lab	
propofol	External Lab	
psilocin	External Lab	
risperidone	External Lab	